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Worldwide Report

**NUCLEAR DEVELOPMENT
AND
PROLIFERATION**

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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23 September 1985

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HONG KONG

ECOLOGIST GROUPS SAY NUCLEAR THREAT TO CITY 'REAL'

Hong Kong HONGKONG STANDARD in English 19 Jul 85 p 3

[Text]

THE NUCLEAR threat affects Hongkong as much as it does the world, according to two ecologist groups yesterday.

Speaking after a Rotary luncheon meeting, the Secretary of Friends and the Earth, Miss Linda Siddall, said the Daya Bay Nuclear Power Plant could endanger Hongkong since its radioactive effluent will flow into a fish breeding ground.

She said the public should not be complacent about safety standards since all such power plants emit radioactivity.

The group has been monitoring the Daya Bay Nuclear Plant project and has been pressing for more information on safety precautions, training and standard of its operation.

She said once her group members return from vacation, they would tackle the nuclear threat issue more aggressively.

Miss Siddall said Hongkong is vulnerable to a missile strike since its harbour is regarded as a strategic site and it was not uncommon for ships of the United States Seventh Fleet to anchor in these waters.

She then broached the concept of declaring this a nuclear free zone. She said some priests are interested in forming an alliance

with the Nuclear Free Pacific Movement to raise public awareness against further atomic weapons and power plants.

"They are also approaching a number of local churches to declare their churches nuclear free zones as a symbolic gesture to heighten people's awareness," she said.

Miss Siddall said the group has been in touch with some churches wishing to declare the second Sunday of August — a week after the anniversary of the Hiroshima bombing — a peace day in commemoration of the atomic strike casualties.

The Student Christian Movement yesterday announced that it will assemble on August 6 to mark the 40th anniversary of the destruction of Hiroshima that launched the atomic age.

The Reverend Fund Chi-wood said the movement will collect signatures from more than 10 sympathetic societies as a protest against nuclear installations.

He said the group will show the film, *No More Hiroshima* on the historic day to remember those who died in the holocaust and those living under the threat of nuclear power plants.

After the film, the society will discuss the Daya Bay project and the right of nuclear-capable warships calling here.

CSO: 5150/0045

JAPAN

NUCLEAR COOPERATION AGREEMENT SIGNED WITH PRC

OW310629 Tokyo KYODO in English 0617 GMT 31 Jul 85

[Text] Tokyo, July 31 KYODO -- Japan and China Wednesday signed a nuclear power cooperation agreement that clears the way for export of Japanese nuclear technology to China. The accord marks Japan's entry into the international competition to supply China's huge energy needs, following a similar pact signed last Wednesday by China and the U.S., and earlier nuclear technology agreements between China and France, West Germany, Britain, Belgium, Argentina, and Brazil.

The agreement is the strictest nuclear power pact China has signed to date, requiring China to allow on-site inspection by the International Atomic Energy Agency (IAEA) to ensure that Japanese nuclear technology "is used for peaceful purposes only," an official of the Japanese Science and Technology Agency said. He said that Japan, as a country which adheres to a strict non-nuclear policy, regards IAEA safeguards as "the most important part" of the pact. The Chinese were at first reluctant to agree to the inspections, which were finally included in the present agreement, initialed last month in Beijing after a series of six talks that began in September 1983.

Japanese Foreign Minister Shintaro Abe and Chinese Foreign Minister Wu Xueqian signed the final agreement Wednesday during a two-day ministerial conference in Tokyo that also included discussions on bilateral trade problems and talks on East-West and North-South political problems. The pact may give a boost to Japanese manufacturers of nuclear power equipment, including Mitsubishi Heavy Industries, which is scheduled to deliver, in January 1986, a reactor ordered two years ago for a nuclear power plant in Qinshan.

However, it is not immediately clear how the Japanese will be able to compete in the Chinese nuclear power market, since all Japanese nuclear production depends on technology licensed from U.S. firms, which could refuse to grant permission for production of goods for export to China, the science and technology official said. The U.S. firms may be interested in collecting royalties on sales of Japanese-made nuclear equipment to China, or they may limit the role of Japanese manufacturers to peripheral equipment, say industry analysts.

China is considered the biggest potential market in the world for nuclear power equipment because of the inadequacy of its present energy capacities for its ambitious plan to quadruple production by the year 2000, and because nuclear power equipment sales in many developed countries are being thwarted by anti-nuclear movements. China is planning or has under construction four nuclear power projects, with total output planned to reach 10 million kilowatts by the end of the century, or about 5 percent of China's total electric energy needs. France and Britain have already assisted China in construction of one project, and France and West Germany began negotiations last month for cooperation on another in Jiangsu Province north of Shanghai.

CSO: 5160/015

JAPAN

NAKASONE ON HIROSHIMA BOMBING, NUCLEAR WEAPONS

OW011117 Tokyo KYODO in English 1055 GMT 1 Aug 85

[Text] Tokyo, Aug. 1 KYODO -- Prime Minister Yasuhiro Nakasone told America TV viewers Thursday that the U.S. atom bombing of Hiroshima and Nagasaki during the Pacific war was an act which violated international law. Asked to comment on the bombing by the U.S. NBC in New York for video taking, Nakasone said that the bombing was an inhumane act. "Such indiscriminatory attack on civilians violated international law. (The bombing) should not have taken place," the prime minister said as he sat in his office. Japan does not and will not possess nuclear arms, he said.

The interview was conducted by NBC to mark the 40th anniversary of the atom bombing of the two cities. An American on the program told Nakasone that it is known to everyone in the United States that U.S. ships carrying nuclear weapons are visiting Japanese ports. Nakasone said in response that port calls in Japan by U.S. ships carrying nuclear arms are subject to the prior consultation provision in the Japan-U.S. security treaty. International law does not allow Japan to check each U.S. ship entering Japan, he said.

But he said that the treaty should be based on mutual trust between the two countries and expressed his conviction that U.S. ships carrying nuclear weapons have never entered Japanese ports.

On other subjects, Nakasone said he felt it unfortunate that a trade protectionist bill is now before U.S. Congress. Such a bill should never be made into law, he said. He said that Japan is making its utmost efforts to open its markets wider to foreign goods and that he is convinced the efforts will produce fruitful results.

CSO: 5160/017

JAPAN

BRIEFS

KYUSHU ELECTRIC TO BUY CANADIAN URANIUM--Tokyo, July 19 KYODO--Kyushu Electric Power Co. said Thursday it will buy "yellow cake," semi-refined uranium ore, from two Canadian firms to diversify its supply sources. Formal signing of a contract was to take place the same day in Saskatoon, Saskatchewan Province. A company spokesman said the deal with Saskatchewan Mining Development Corp. (SMDC) and Eldorado Nuclear Ltd. calls for the two government-run firms to supply a total of 3,000 short tons of yellow cake (1 short ton equals 0.9072 ton) spaced over a 13-year period starting 1987. The yellow cake to be supplied will be produced and refined by Key Lake Mining Co., which was set up jointly by SMDC, Eldorado and others and owns one of the world's largest uranium mines. Kyushu Electric is the second Japanese electric power company to purchase yellow cake from the mining company following Tohoku Electric Power Co. [Text] [Tokyo KYODO in English 0857 GMT 18 Jul 85 OW]

'BAN-THE-BOMB' CONVENTION IN HIROSHIMA--Hiroshima, Aug. 2 KYODO--An international convention opened here Friday to discuss efforts toward the elimination of nuclear weapons and the promotion of world peace. The opening session of the 1985 World Ban-the-Bomb Convention, marking the 40th anniversary of the atomic bombings of Hiroshima and Nagasaki during World War II, was attended by some 200 persons, including about 70 delegates from 29 foreign countries and international organizations. China sent an official delegation to the meeting for the first time in 20 years. Socialist-backed Japan Congress Against Atomic and Hydrogen Bombs (Gensuikin) and the nation's biggest labor organization, the General Council of Trade Unions of Japan (Sohyo) boycotted the convention because of a rift with the rival communist-supported peace organization, the Japan Council Against Atomic and Hydrogen Bombs (Gensuikyo). [Text] [Tokyo KYODO in English 0129 GMT 2 Aug 85 OW]

NUCLEAR AUTHORITY ADOPTS LASER FUEL ENRICHMENT--Tokyo, July 26 KYODO--The Japanese Government Friday partially revised its energy research and development program by adopting the U.S.-developed laser method for nuclear fuel enrichment for practical application. So far, the governmental Power Reactor and Nuclear Fuel Development Corp. conducted R and D on the centrifugal separation method for nuclear fuel enrichment. The government also made a guarded statement about the proposed but controversial ocean dumping of low-level radioactive waste in consideration of international repercussions. The government said land dumping of such waste will begin in 1991. [Text] [Tokyo KYODO in English 0951 GMT 26 Jul 85 OW]

PEOPLE'S REPUBLIC OF CHINA

PRC ATTENDS NUCLEAR ENERGY MEETING IN BRUSSELS

OW221012 Beijing XINHUA in English 0655 GMT 22 Aug 85

[Text] Brussels, August 21 (XINHUA)--The installed nuclear capacity in the European community is approximately 70-gigawatt electricity (GWE) and the annual electricity generated represents around 10 percent of the community's primary energy needs. The net production annual rate is equivalent to 90 million tons of oil, quite a respectable "oilfield," which corresponds to around 70 percent of the present annual oil production of Saudi Arabia.

This was announced by Sergio Finzi, chairman of the 8th International Conference on Structural Mechanics in Reactor Technology (SMIRT), which is taking place in Brussels. The conference, held here between August 19-23, brought together over 1,200 scientists and engineers from 30 countries, including China.

Finzi, director of nuclear research and development of the European commission, stressed the contributions made by the nuclear industry to the community's energy independence, to employment and to technological progress.

He said that the nuclear industry favors employment. A nuclear station of 1 GWE requires almost twice the work of a coal-fired one. He pointed out that research into solutions to the large number of problems posed by the development of nuclear energy has made a substantial contribution to other technological fields: computer programme development, automation, remote handling, robotics, radiochemistry, development of long life components and structural mechanics.

Finzi believed that the conference should explore the opportunity to apply to other sectors the wealth of technological know-how in the field of structural mechanics, which finds applications in the chemical, building, transport and offshore oil industries, etc.

The SMIRT conference was first founded in 1971. Since then, scientists from research organizations, universities and industries have met together every two years in summer to review progress in this most important field of nuclear reactor technology. In the course of the years, the SMIRT conferences have become more and more dominated by the problems of ensuring structural integrity and therefore reactor safety.

PEOPLE'S REPUBLIC OF CHINA

CHINA'S NUCLEAR TESTING PROGRAM TRACED

HK271029 Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 22 Aug 85 p 8

[Article by Zhang Zhishan [1728 1807 0810]: "On the Birth of a Nuclear Bomb Base--excerpted from 'SHEN JIAN' (THE MAGIC SWORD)"]

[Text] China's nuclear test base has been set up for 25 years. How did this base come into being? It was in 1958....

In the early morning of 15 August, a small-type special mixed train slowly pulled itself into an unknown small railway station in the western part of China.

This special train started the journey from Shangqiu on 10 August. When we started, we were briefed that a special mission was to be carried out. But not a word was disclosed as to our destination, what specific work we were engaged in or how long it would take. On 17 August a survey team was formed in Dunhuang, and all-round survey work began on 20 August. In late August a meeting was held for cadres and party members at a newly built movie house in Dunhuang, and the mission was made clear to us, that a range for the testing of atomic and hydrogen bombs was to be built. The whole troop became animated at the mention of the truth. Many comrades were so excited that tears filled their eyes, for they had never imagined that they would be able to take part in such a magnificent undertaking in their whole lives. We pledged to exert all our efforts and to render meritorious service in building our powerful defense and for our own atomic and hydrogen bombs.

Through 3 months hard work and struggle, the point on the nuclear test range for the center of explosions was determined by mid-November 1958; meanwhile the command area and the living area had also been chosen.

The commander arrived in mid-November. He made an analysis of the topography, the geological structure, the roads and water resources around the entire range, and the conditions of all locations within the range; then came to the conclusion that it was not an ideal site for the range. The chief consideration was the problems of water resources and road conditions. In addition, the test range selected was too close to the county seat, which was not appropriate to a high-yield nuclear test. And the command and living areas would be polluted to a certain degree because of wind direction. Through ample discussion, it was determined that a new site would be found for the test range.

By mid-December, the report on changing the site of the range had been approved, and survey planes were waiting at Hami Airport. Headquarters was set up in Turpan, and a radio station was established as the communications center.

At dawn on 22 December 4 cars and 2 "63" lorries carried our party of more than 20 persons, organized into several survey groups, and took us straight to the designated site.

It was once the territory of the ancient state of Loulan, and an important route to the ancient Silk Road. Despite the winter we could still see the fertility of the soil, with an abundance of water and grass. It was really a wonderful place!

We went further westward, and arrived in the neighborhood of Huangyanggou. There we spent 2 or 3 days making initial investigation into the topography, the landform, water resources, and the quality of the soil there. We shared the opinion that topographically the area was broad, with a mountain to the north, water resources to the south, and a zone 60 km in breadth from north to south, and more than 100 km from east to west. It was a marvelous site for conducting nuclear tests.

In March 1959, the survey team was transferred from Dunhuang to Turpan. The survey team and the hydrological team conducted a second comprehensive survey of the site for the test range. The greatest achievement of that survey was determining the center of the range, and providing data for determining the site for the living area.

The third survey took place between winter 1959 and early spring 1960. That was a historic action which fixed the center of the explosion of China's first nuclear test.

Based on technical requirements, there had to be a distance of 60 or 70 km between the command building and the center of the explosion. At the same time, the explosion must be directly in view when it took place. When the first pile was erected to mark the center of the explosion, it was in view but only 50 km from the command site, which was too close. Then [?] up another pile at a distance of 90 km to which we brought two carloads of firewood and lit it with oil, but we failed to spot it even with the help of a theodolite. Finally, we determined the position of the third and last pile on a height 70 km away, which met the requirements. In order to determine the ideal position for the erection of this ordinary pile, more than 1,000 fighters fought against the scorching heat and bitter cold; and they lived in tents, drank bitter water, and worked in the deserted Gobi for exactly 2 years.

CSO: 5100/4136

BULGARIA

PARTY DAILY COMMENTS ON NUCLEAR NON-PROLIFERATION

AU281500 Sofia RAVOTNICHESKO DELO in Bulgarian 27 Aug 85 p 5

[Radoslav Khristov article: "Non-Proliferation of Nuclear Arms--a Task for All Mankind"]

[Text] The third conference to review the operation of the Nuclear Arms Non-Proliferation Treaty opens today in the Palace of Nations in Geneva. World public opinion will follow its proceedings with exceptionally great interest. The results of the conference will determine to a certain extent the future of the treaty, which is being examined as a basis for overall activities in the field of nuclear disarmament.

In the contemporary international situation, when the struggle to prevent nuclear war has become a primary concern, the importance of the Non-Proliferation Treaty has increased to an extraordinary extent. For more than 15 years the treaty has successfully contributed to limiting the nuclear risk by fulfilling its principal task--to prevent the appearance of new nuclear powers, and to lessen the likelihood of a regionally-based nuclear conflict breaking out. This is achieved through the obligations accepted by the member countries; in general terms, the nuclear powers are not to provide nuclear weapons and the materials required for their production, while the non-nuclear powers are not to manufacture nor acquire such weapons.

The Non-Proliferation Treaty has received wide international recognition. Almost 130 states are now parties to the treaty, the largest number of participant countries of all treaties now in effect in the field of disarmament. The continually increasing number of non-nuclear countries signing the treaty provides clear evidence that overall the Non-Proliferation Treaty satisfies the interests of all nations in the world.

One of the tasks of the review conference in Geneva is to promote through its decisions the acceptance of the treaty by new states, and to further the gradual universal recognition of its conditions in international law. It is especially vital to attract the so-called "near-nuclear" states, which already possess the nuclear-technological potential to manufacture nuclear weapons independently. A cause of anxiety in this connection are the nuclear ambitions and tangible preparations of South Africa, Israel and Pakistan. Reports are becoming more frequent regarding Brazil's and Argentina's plans to build

nuclear weapons. It is likely that the review conference will once more call on participant states, and certain Western powers in particular, to discontinue any nuclear collaboration with these countries until they place all their nuclear activities under the control of the International Atomic Energy Agency. Appeals will once again be made from the conference platform to France and China to join the treaty. The review conference is expected also to make a statement about strengthening the role of the International Atomic Energy Agency in maintaining the conditions established by the treaty.

In the Nuclear Weapons Non-Proliferation Treaty the most important aspects of the efforts aimed at achieving nuclear disarmament are, as it were, interwoven into a complicated knot. It is universally recognised that the discussion of these questions will be of key importance for the success of the review conference....

Due to the obstructionist approach of the United States and certain other Western countries, a number of non-aligned and neutral states display a tendency to criticize the overall fulfillment of the relevant articles of the treaty. These states stress that the nuclear powers have accepted or confirmed in the treaty obligations to "conduct negotiations in a spirit of good will for taking measures for an early cessation of the nuclear arms race," as well as "to discontinue once and for all experimental explosions of nuclear weapons."

Indeed, as far back as 1980 the United States and Great Britain unilaterally broke off negotiations with the USSR, in which almost complete agreement had been reached on the articles of a treaty for a complete and total nuclear test ban. They announced later to the world that the achievement of such an all-embracing ban merely remains a "longterm" aim, and continued to raise artificial obstacles to the holding of talks on this problem at the Disarmament Conference in Geneva. It is also an indisputable fact that the United States, in its attempts to win unilateral military advantages, is deliberately using delaying tactics, thereby also threatening a collapse of talks with the USSR on space and nuclear weapons. The Pentagon's programs within the framework of the "Strategic Defense Initiative" are objectively leading to a breakdown of a number of existing international agreements in the nuclear disarmament field, which would even further aggravate the situation in connection with fulfilling the obligations accepted in the Non-Proliferation Treaty.

The socialist countries continue to hold the same critical positions regarding these actions. However, they do not merely limit themselves to this.

The socialist countries are striving to make their contribution towards creating favorable conditions for the holding of serious bilateral and multilateral negotiations on the whole range of problems concerning nuclear disarmament. Practical expressions of this are their numerous constructive proposals and the flexibility they have displayed in seeking mutually acceptable solutions at all disarmament forums. Especially important are the unilateral steps taken by the USSR in order to set a good example, including its introduction of a unilateral moratorium on nuclear weapons tests. It is difficult also to appraise the vast importance of the USSR's undertaking not to be the first to use nuclear weapons and the guarantees it has given not to use nuclear weapons

against countries which have renounced their manufacture (such as the non-nuclear countries in the Non-Proliferation Treaty) and which have no nuclear weapons on their territory.

At the review conference there will also be expressions of the growing support for the idea of nuclear-free zones in different regions of the world. The right of states to be party to the creation and operation of such zones is recognized in Article VII of the Non-Proliferation Treaty. The active efforts of a number of countries in Europe, in the Balkans, Northern Europe, and in other parts of the world to achieve concrete results in establishing nuclear-free zones form a valuable contribution to the implementation of the clauses of this treaty. An important step forward in the movement for a world free of nuclear weapons was the agreement approved recently by 13 non-nuclear states for such a zone in the South Pacific region.

The socialist countries except all member-states of the Non-Proliferation Treaty to display a responsible approach to strengthening the treaty's conditions, and to plan concrete measures aimed at achieving a breakthrough in the efforts to achieve nuclear disarmament and the prevention of nuclear war.

The Bulgarian public fully supports the noble aims and principles of the Nuclear Weapons Non-Proliferation Treaty and will follow with great interest the proceedings of the conference to review the treaty's effect, which some people already regard as a starting point for preparations to extend the treaty after it expires in 1995.

CSO: 5100/3038

INTER-AMERICAN AFFAIRS

WRITER PERCEIVES NUCLEAR ARMS RACE IN SOUTH AMERICA

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Aug 85 p 12

[Article by Roberto Godoy]

[Text] Nuclear power is very close to becoming a military reality in Latin America and is already a reality in the South Atlantic. At least five countries of the continent and Caribbean--Argentina, Brazil, Chile, Cuba and Peru--are conducting development programs on atomic technology beyond international controls. South Africa is already dominating the process, performing tests and manufacturing low-power systems, although it does not officially acknowledge the existence of a strategic force in its defense structure.

All those undertakings have two points in common: they are invariably subordinate to local agencies connected with national security, and they are absolutely secret. Or almost so: on 9 December 1983 O ESTADO DE SAO PAULO revealed for the first time in Brazil all the details of a project being carried out at the Aerospace Technology Center (CTA), the Institute for Nuclear and Energy Research and the Army Technology Center (in addition to other institutions for isolated research) which will give the country scientific self-sufficiency in this sector by 1990. At that time, a decision will be made at the government level as to whether that capability will or will not be used for the construction of nuclear weapons.

Meanwhile, theoretically, the secretive community involved in this process explained how, in the beginning, products of military application would be manufactured by Brazil. The principal item is a warhead of 20 to 30 kilotons (2 to 3 times more powerful than the bomb used at Hiroshima) launched by an inert guided missile and fixed on the large satellite launching rocket which the CTA is building--a vector with a range of at least 3,000 km. The core of those investigations is the highly secret Institute for Advanced Studies, a unit of the CTA in Sao Jose dos Campos, where certain trump cards are being played by the research scientists, like isotopic separation and the enrichment of uranium by laser stimulation. Or the engineering of rapid reactors of the fast-breeder type which can operate with abundant thorium in various areas.

With further reference to the strategic sector, the priority item is a nuclear submarine for the navy, equipped with a compact power plant and capable of remaining submerged for long periods of time and of launching antinaval missiles through means of a torpedo-launching tube. With regard to the army, the focus is tactical, covering medium-range missiles (100 to 600 km) with average loads of 3 to 10 kilotons, somewhat akin to the carrying capacity of the French Pluton or the American Lance.

Nevertheless, the most significant innovation in the hemisphere is the confirmation of Cuba's nuclear program, announced by Fidel Castro himself a little more than 2 weeks ago, when he visited the construction site of the first plant being built on the island of Cienfuegos. This installation is being put together with the assistance of Soviet experts who will also assist in the installation of a second unit on the east coast. However, U.S. officials consider "remote" the possibility of a clandestine deviation from the peaceful objectives of the generation of energy toward military use, "principally because this would be very bad for the Russians, the Cuban mentors." Castro told reporters that "Cuba's future is atomic."

In South America, the most advanced and successful strides are those made by Argentina which now controls the entire uranium cycle and could, with a little outside help, build the bomb within 8 months from the moment it decided to set off the production mechanism. The Alfonsin government has reoriented the basic military objective to the development of a nuclear submarine of 4,000 tons displacement of the English "Superb" type. The purchase of five Mirage-IV planes, long-range atomic bombers, from France (which are being replaced by intercontinental missiles) has been temporarily shelved.

In Peru and Chile, progress in research is very slow. Part of the Argentine experiments aimed at defense applications is being consolidated in Peru's principal power reactor, operated by the CNEA (National Commission for Atomic Energy), in a partnership arrangement. A machine of 10 megawatts is operating without supervision in Huarangal. The Peruvian Institute of Nuclear Energy employs physicists, chemists, engineers and specialists in uranium metallurgy on a permanent basis. In Santiago, President-General Augusto Pinochet has established the following goals to be achieved in this sector: "the attainment of nuclear knowledge and the utilization of that resource to guarantee both the sovereignty and integrity of the nation." Hence, diplomatic officials and advisers, directed by the president, have sought to hire qualified professionals with successful backgrounds considered as "barely relevant."

8568

CSO: 5100/2162

ARGENTINA

YRIART: 1985 CNEA BUDGET FIGURES DEFY OFFICIAL OPTIMISM

Buenos Aires ENERGEIA in Spanish No 52 [1985] pp 13-17

[Article by Martin F. Yriart: "1985 Budget: The CNEA Cannot Pay"; passages enclosed in slantlines printed in boldface]

[Text] In the 18th Century good Bishop Berkely, proclaimed that the world exists because we believe in it. This happy voluntarism continues today and enjoys very good health in the Argentine Republic and in few instances is it more clearly demonstrated than in the CNEA [National Commission for Atomic Energy] budget. For Engineer Jorge Lapena, undersecretary for Energy Planning, the credit allocated to the CNEA for 1985 will insure the completion of the Atucha II Nuclear Powerplant and the Heavy Water Industrial Plant [PIAP] in time for them to begin operations in 1990, when the timetables of the Undersecretariat require it. For Deputy Jorge Chehin (UCR [Radical Civic Union]), president of the Science and Technology Committee of the lower chamber, the future of the CNEA "is in no danger" and the CNEA may finish Atucha and Arroyito "and also continue basic and applied research."

Unfortunately, despite so much Berkelian optimism, checked with calculator and well-sharpened pencil in hand the CNEA figures /do not add up/. And it is not a matter of a difference of small amounts which can be made up with a few savings, a slight change in timetables or a little more financing from suppliers. The difference between the figures approved by the Secretariat of Finance for 1985 and those requested by the CNEA for accomplishing its mission is a vast and dark abyss, a veritable yawn by the universe, as the pre-Socratic cosmologists would have said, into which many illusions may tumble.

The charts published with this article require no greater comment. With wages paid and financial obligations met, the CNEA would have to allocate /all its funds available for investment/ for the completion of Atucha II and Arroyito.

The CNEA budget--as is shown in Chart 1--does not "hold water" in two critical aspects: /Item 12 "Nonpersonnel goods and services"/ (which means current non-financial costs, excluding wages) and Item 42 /"Construction"/ (which means planned projects, excluding reequpment of already existing projects).

Of the 177 billion Argentine pesos of December 1984 value which the CNEA estimated it requires for all purposes for fiscal year 1985, Finance granted it only 153 billion. This cutback took place precisely in Items 12 and 41. "Non-personnel goods and services" was reduced from 26,472,000,000 Argentine pesos to

17,508,000,000, which means a trimming of 8,964,000,000 or 33.86 percent. "Construction" was reduced from 89,430,000,000 pesos to 73,844,000,000; the reduction of 15,586,000,000 pesos represents 17.43 percent of the amount requested.

Translating these values into dollars as of the date of each budget, the \$161.2 million required for "Goods and Services" were cut back to \$108.5 million and the \$544.6 million for "Construction" were reduced to \$457.7 million of that green money.

The tables of the 1985 National Budget contain an even greater cutback, however, (including a forecast of a 222-percent inflation for the entire year, which would make even Baron von Munchausen blush). Actually, the final figures allocated represent \$194.7 million for "Goods and Services" and \$430.9 million for "Construction," which means 35 and 21 percent less than the amounts originally requested, respectively.

The approval of an official budget subdivided into allocations is an explicit mandate for spending a certain amount of money in a specific way. To stray from that mandate is misappropriation. It would appear, however, that some authorities such as Lapena and Chehin consider it to be legal, since in their statements is found a common tacit understanding: If the amounts allocated to projects or research are not in themselves sufficient, the CNEA will extract funds from other budget items to cover the difference. "All is for the best in this world" [In French] as the good Doctor Pangloss maintained (to quote a third 18th Century personage).

Charts 2 and 3 and their notes are of Demosthenean eloquence. Analyzing the hypotheses referring to Item 42 "Construction," as is shown in Column (3), if the allocation assigned to the overall number of projects considered by the CNEA is proportionately distributed, with priority given to the generation of electricity and its necessary supplies, /Atucha II may only receive 66 percent of the funds required for meeting the project timetable, which ends in 1989/. Arroyito would be thrown out of phase by 0.85 percent [as published] (its timetable is more rigid because it is conditioned by the lead time required for providing Atucha II with its first load of deuterium oxide. The rest suffer equally.

A first alternative examined in Column (4) shows that if Atucha and Arroyito are assigned all the funds needed for completion on the date established by the Energy Plan, there will not be enough to cover the amount required for completing the safety installations of Embalse and it would also be necessary to halt all the other project programs. This could lead to /the cancellation of the operating license of the powerplant, forcing it to go out of service until those installations are completed and to the dismantlement of the CNEA research and development programs/ many of which are indispensable for the very continuation of the operation of the powerplants. Other items affected would be the /production of isotopes for medicine and basic nuclear research./ In short, a veritable "ikebana," as Minguito would have said [allusion not clear].

CHART 1

CNEA 1985 BUDGET

| Item | IN MILLIONS OF DEC 1984 ARGEN- TINE PESOS | Preliminary CNEA Draft (*) | Preliminary Finance Secretariat Draft (**) | IN MILLIONS OF CURRENT 1985 ARGENTINE PESOS | Budget Draft Law (***) | RESULTING UPDATING FACTORS |
|---|---|-------------------------------|---|---|---------------------------|----------------------------------|
| | | (1) | (2) | (3) | (4) | (3)/(1) (3)/(2) |
| EXPENDITURES | | | | | | |
| Item 11 - Personnel | | 5,151 | | 10,697 | 2.08 | 2.08 |
| Item 12 - Nonpersonnel goods and services | | 26,472 | 17,508 | 35,692.6 | 1.35 | 2.04 |
| Item 31 - Transfers for financing current expenditures | | 192 | 192 | 398.8 | 2.08 | 2.08 |
| Item 41 - Capital goods | | 1,981 | 1,981 | 3,935.3 | 1.99 | 1.99 |
| Item 42 - Constructions | | 89,430 | 73,844 | 146,937.8 | 1.64 | 1.99 |
| Item 51 - Preexisting goods | | 292 | 292 | 580.1 | 1.99 | 1.99 |
| Subtotal | | 123,518 | 98,968 | 198,241.6 | 1.61 | 2.00 |
| Item 21 - Debt interest | | 45,968 | 45,968 | 68,731.0 | 1.50 | 1.50 |
| Subtotal current and capital expenditures | | 196,486 | 144,936 | 266,972.6 | 1.58 | 1.84 |
| Item 8i - Debt amortizations | | 6,325.8 | 6,325.8 | 13,284.2 | 2.10 | 2.10 |
| Item 91 - Advances to suppliers | | 1,626.5 | 1,626.5 | 3,415.6 | 2.10 | 2.10 |
| Total expenditures | | 177,438.3 | 152,888.3 | 283,672.4 | 1.60 | 1.86 |

Chart 1 [continued]

FINANCING

| | (1) | (2) | (3) | (4) | (5) |
|-----------------------|-----------|-----------|-----------|------|------|
| Specific funds | 19,770.9 | 19,770.9 | 41,518.8 | 2.10 | 2.10 |
| Use of credit | 22,221.2 | 6,867.0 | 13,949.7 | .63 | 2.03 |
| Advances granted | 14.8 | 14.8 | 14.8 | 1.00 | 1.00 |
| Treasury contribution | 135,431.4 | 126,235.6 | 228,189.1 | 1.68 | 1.81 |
| Total Financing | 177,438.3 | 152,888.3 | 283,672.4 | 1.60 | 1.86 |

Explanations: (*) 164.2 Argentine pesos to the dollar;
 (**) 161.33 Argentine pesos to the dollar;
 (***) 341 Argentine pesos to the dollar.

CHART 2

Item 42 - Construction

In millions of Argentine Pesos

| DISTRIBUTION OF INVESTMENT | CNEA PRELIMINARY DRAFT Dec 1984 Pesos | (2) | (3) | DRAFT LAW 1985 Pesos | CASE A 1985 Pesos | CASE B 1985 Pesos |
|--------------------------------|--|-----|---------|-------------------------|----------------------|----------------------|
| (1) | | | | (4) | (5) | (6) |
| Atucha II Nuclear Powerplant | 50,327 | | 104,705 | 69,199 | 104,705 | 104,705 |
| Heavy Water Industrial Plant | 19,200 | | 40,193 | 38,082 | 40,193 | 22,481 # |
| Embalse Nuclear Powerplant | 1,798 | | 3,759 | 3,641 | 2,040 + | 0 |
| Uranium Concentrate Product | 759 | | 1,594 | 1,510 | 0 | 0 |
| Special Alloys Factory | 1,228 | | 2,569 | 2,488 | 0 | 0 |
| Nuclear Fuels | 1,209 | | 2,531 | 2,390 | 0 | 0 |
| Subtotal 1 | 74,576 | | 155,351 | 117,310 | 146,938 | 127,186 |
| Enrichment | 5,514 | | 11,580 | 10,920 | 0 | 0 |
| Reprocessing | 3,114 | | 6,535 | 6,210 | 0 | 0 |
| Tandar Accelerator | 604 | | 1,266 | 1,223 | 0 | 0 |
| Heavy Water Experimental Plant | 1,554 | | 3,263 | 3,082 | 0 | 0 |
| Uranium prospecting | 636 | | 1,272 | 1,208 | 0 | 0 |
| Radioisotope production | 900 | | 1,881 | 1,787 | 0 | 0 |
| Rest of CNEA | 2,562 | | 5,503 | 5,198 | 0 | 0 |
| Subtotal 2 | 14,854 | | 31,100 | 29,338 | 0 | 0 |
| Total Item 42 (I + II) | 89,430 | | 186,651 | 146,938 | 146,938 | 127,186 |

EXPLANATIONS:

CASE A: Distribution of credits if the total amount of the credits are maintained according to the budget draft law and nuclear-electric production is given priority.

CASE B: Same as Case A if the total amount is decreased by 19,752 million Argentine pesos to cover the difference in credit of Item 12 necessary to maintain the minimum operation of the CNEA.

+ : Insufficient credit for the Embalse Nuclear Powerplant and the complete halt of all the rest of activities (zero credit).

Ø : Insufficient credit for maintaining the rate of work of the Heavy Water Industrial Plant and zero credit for the remaining activities including the Embalse Nuclear Powerplant.

CHART 3

NONPERSONNEL GOODS AND SERVICES

Expressed in Millions of Argentine Pesos

| DISTRIBUTIONS OF COSTS BY PROGRAM | CNEA PRELIMINARY DRAFT | | DRAFT LAW BILL | | CASE I | | CASE II | |
|--|------------------------|------------|----------------|------------|------------|------------|------------|------------|
| | Dec 1984 Pesos | 1985 Pesos | 1985 Pesos | 1985 Pesos | 1985 Pesos | 1985 Pesos | 1985 Pesos | 1985 Pesos |
| | (1) | (2) | (3) | (4) | (5) | | | |
| NUCLEAR PLANT INST. | 15,337 | 32,102 | 16,674 | 16,674 | 30,609 | | | |
| Atucha 1 Powerplant | 4,523 | 9,448 | | | 9,488 | | | |
| Embalse Powerplant | 10,101 | 21,121 | | 16,674 | 21,121 | | | |
| Rest of the program | 713 | 1,493 | | 0 | 0 | | | |
| RADIOISOTOPES AND RADIATIONS | 1,042 | 2,178 | 2,095 | 2,095 | 0 | | | |
| RESEARCH AND DEVELOPMENT | 1,679 | 3,518 | 3,375 | 3,375 | 3,375 | | | |
| RADIOLOGICAL PROTECTION AND SAFETY | 212 | 444 | 425 | 425 | 425 | | | |
| MANAGEMENT, QUALIFICA- TION AND SUPPORT | 5,459 | 11,456 | 7,612 | 7,612 | 5,048 | | | |
| Peru Project | 1,558 | 3,266 | | 3,266 | 3,266 | | | |
| CNEA Financial Costs | 1,998 | 4,196 | | 4,196 | 1,818 | | | |
| Atomic Center | | | | | | | | |
| Operations | 1,172 | 2,461 | | 150 | 0 | | | |
| Rest of the Program | 731 | 1,533 | | 0 | 0 | | | |
| SUPPLIES TO NUCLEAR POWERPLANTS | 2,743 | 5,747 | 5,512 | 5,512 | 5,512 | | | |
| TOTALS | 26,472 | 55,445 | 35,693 | 35,693 | 35,693 | | | |

CASE I: Distribution of credits pursuant to the budget draft law. This means: 1) Shutdown of Atucha 1 Powerplant; 2) insufficient credit for operation of the Embalse Nuclear Powerplant; 3) Shutdown of atomic centers, and 4) zero credit for the remaining activities of CNEA infrastructure. The shutdown of Atucha 1 and the insufficiency of credit for Embalse would mean an almost total decline in the generation of specific funds at the same time, in opposition to the supposition of financing considered in the budget draft law.

CASE II: Distribution of credits by program, maintaining the total amount of the credit in Item 12 pursuant to the budget draft law and giving priority to the activities which create specific funds. This means: 1) insufficient credit for complying with all the financial commitments of the CNEA and, 2) zero credit for all the remaining activities of the CNEA, which would contradict the hypothesis that the nuclear powerplants are in a condition to create funds.

CHART 4

CNEA: BUDGET REQUESTED FOR 1985 - ITEM 42 - CONSTRUCTION

In Millions of December 1984 Pesos

| Distribution of Investment | Total | Percentage |
|---|--------|------------|
| I. Nuclear-Electric Operation | | |
| Atucha II Nuclear Powerplant | 50,372 | 56.33 |
| Embalse Nuclear Powerplant | 1,798 | 2.01 |
| Heavy Water Manufacture (PIAP and PEAP [Heavy Water Industrial Plant and Heavy Water Experimental Plant]) | 20,764 | 23.22 |
| Production of Uranium Concentrates and Refined Uranium | 759 | .85 |
| Fabrication of Special Alloys | 1,228 | 1.37 |
| Nuclear Fuels (Development of Production Engineering of Fuel Elements of the Embalse and Atucha II Type) | 1,209 | 1.35 |
| Subtotal 1 | 76,130 | 85.13 |
| II. Research and Development Activities | | |
| Reprocessing | 3,114 | 3.48 |
| Enrichment | 5,514 | 6.17 |
| Prospecting, Evaluation and Development of Uranium Reserves | 606 | .68 |
| Electrostatic Accelerator | 604 | .68 |
| Production of Radioisotopes and Radiations | 900 | 1.01 |
| Reactors | 879 | .98 |
| Support Infrastructure (Construction, Installation and Equipping of Atomic Centers) | 840 | .93 |
| Other Activities | 843 | .94 |
| Subtotal 2 | 13,300 | 14.87 |
| TOTAL ITEM 42 (I + II) | 89,430 | 100.00 |

CHART 5

CNEA: BUDGET REQUESTED FOR 1985 - ITEM 12 - NONPERSONNEL GOODS AND SERVICES

In Millions of December 1984 Pesos

| Distribution of Costs | Amount | Percentage |
|---|-----------|-------------|
| Powerplant Operation | 14,624 | 55.25 |
| Peru Atomic Center Project | 1,456 | 5.50 |
| Production and Purchase of Raw Materials (Uranium Concentrate, Zircalloy, Uranium Dioxide) | 2,280 | 8.61 |
| Production, Sale and Transportation of Radioactive Material, Nuclear Medicine Dosimetry | 978 40 | 3.70 .15 |
| Taxes and Bank Commissions | 2,190 | 8.27 |
| Operation of Buildings and Equipment (rents, maintenance, housekeeping, electricity, gas, communications, insurance, fuel and lubricants, repairs, honorariums and payments to third parties) | 1,986 | 7.50 |
| Costs of Administration and Research (warehouses, drugs, transportation of personnel, photocopying, photography and printing, computer services and training) | 1,983 | 7.49 |
| Domestic travel | 257 | .97 |
| Foreign travel | 107 | .40 |
| Contracts (CNEA-KWU and cooperation agreements) | 229 | .87 |
| Minor and contingency expenditures | 342 | 1.29 |
| TOTAL CNEA | 26,472 | 100.00 |

However, this numerical tragicomedy does not end here. The dance continues. Going ahead to Chart 3, everything becomes even more difficult if an attempt is made to palliate the deficit of Item 12 (only 19,752,000,000 Argentine pesos) by subtracting that sum from "Construction," as is noted in Column (5) of Chart 2 and its notes.

Chart 3 completes the panorama of this patently apriori budget consideration. The 55,445,000,000 Argentine pesos requested by the CNEA for its operations (excluding wages and amortizations under Item 12) have now been cut back to 35,693,000,000 pesos in the budget draft law, which means a decrease of 35.6 percent (the same 19,752,000,000 pesos which it was considered would be subtracted in Column (5) of Chart 2).

Column (3) of Chart 3 contains the amounts allocated in the Budget Draft Bill for the "Goods and Services" account of the CNEA, and Column (4) reflects a first hypothesis of the adaptation to reality, retaining the allocations in the amounts and assignments established by law. Considering the internal inflexibility of expenditures, the result is that /it would be necessary to take Atucha I out of operation (literally lock it up), halt the other programs linked to the nuclear powerplants, reduce the activities of atomic centers to less than 10 percent (abolishment of the Balseiro Institute, for example) and halt the activities of the infrastructure (computer center, documentation center, and so forth)./ A direct consequence of this scenario would be that /the CNEA would cease producing electricity/ and as a result it would stop receiving income from that source, collapsing the financial structure of the budget.

The only way of maintaining the powerplants in operation, according to Column (5) of Chart 3, without increasing the amount assigned to Item 12, would be to change the distribution of its allocations. But this is an illusion which is as empty as it is fleeting, because the item "Supplies for Nuclear Powerplants" among others, would go into the red. In plain language this would mean that "the manufacturing of nuclear fuel would be halted" and the powerplants would once more have to be shut down, not to say anything about research and development or production of radioisotopes.

At the time of this writing, it is time to apologize to the reader for this indigestible number soup. However, the fault is that of Lapena and Chelin with their reckless statements, and it is they who must be asked for a rendering of accounts (so to speak) when the potatoes burn (or the lights go out).

In the first week of March Juan Vital Sourrouille received a note from Engineer Alberto Constantini, president of the CNEA, in which he explained, item by item, the shortcomings of the Budget Draft Law as it pertains to the CNEA.

In it, after repeating the need for maintaining the values established by the CNEA in its preliminary budget proposal, he said: "It will not escape the Minister's enlightened recognition that any reduction in the sums indicated will mean not being able to carry out the activities of research and development of this national commission or a serious deterioration of them." (the requirement established by the Secretariat of Energy with respect to the nuclear-electric projects and in particular the entry into operation of the Atucha II

Nuclear Powerplant in 1990, insuring at the same time the operation of the Atucha I and Embalse Nuclear Powerplants).

While 1984 has been a year marked by a delay in projects and the increase in their costs out of all reasonable frames of reference, it would appear that 1985 will only see a greater deterioration of the situation. For many of the CNEA suppliers, certainly, the time has come to face a harsh reality: There will be no orders for work nor money to pay accounts. And to researchers, and even the professionals who are engaged in carrying out the projects, there appears the prospect of a long forced idleness. While their pay will improve relatively due to the results of the efforts by Constantini and the promises made by Secretary of State Operations [Funcion Publica] Jorge Roulet, there will be no gas in the Bunsen burners or sand in the shops.

Upon ending this writing with such a lugubrious conclusion, it only remains for me to thank George Berkely (1685-1753), Rudolf Erich Raspe (1737-1749), Francois-Marie Arouet "Voltaire" (1694-1778) and the ineffable Minguito Tinguitella for the brief moments of pleasure they have contributed to it.

Darning and Embroidery

Some aspects of the composition of the CNEA 1985 budget, which illustrate the meaning of the figures presented in the charts and comments of these pages:

Personnel--Staff programmed for 1985 corresponds to the permanent rolls up to 31 December 1985, but the total number of the positions for making up the personnel required for the operation of the Atucha II and Embalse Nuclear Powerplants is not included.

Nonpersonnel Goods and Services--Sixty-four percent of the amount budgeted is for production and operating costs of nuclear powerplants and their supplies, and the production of uranium including concentrate and radioactive materials (radioisotopes).

Interest on the Debt--Interest for delays in paying suppliers in local money is foreseen, taking into consideration /a delay of 90 days/ in current debt and estimated 1984 residual liabilities, with the hypothesis of payment in the first six months of the 1985 fiscal year. Up to 31 December 1985, the debt for past due interest was \$93,664,100.

Entry into Operation of Atucha II--Its delay will increase to 36 months (six more than in 1984) and it will go into operation around the middle of 1990 as required by the Secretariat of Energy. To comply with this commitment, the Treasury must provide /56 million Argentine pesos in 1985--\$164,000--/ to complete the imports of supplies for the powerplant (which will increase to 15,586,000,000 Argentine Pesos, of which 99.65 percent are financed abroad). If those imports are not made, the CNEA will have to pay 2,518,000,000 pesos (which at December 1984 rates, date of the calculation, will mean \$15,720,000) for storage costs in Europe. This is only 95 times more than the Treasury contribution needed for making the imports.

Heavy Water Industrial Plant--Six months before Atucha is placed in operation, it must provide 566 tons of deuterium oxide to the plant. With an actual capacity of 200 tons per year, /it must go into operation almost three years before./ With the additional six months of delay added in 1984, /it will not be in a position to go into operation until the end of 1987,/ which gives it a narrow margin of safety in the production timetable.

Embalse--There is a /debt of around \$80 million to the AECL/ to which are added forecasts for the accomplishment of various /projects required by the Advisory Committee for the Licensing of Nuclear Installations (CALIN)/ an agency which can order the shutdown of the powerplant if its requirements are not met pursuant to that which has been scheduled.

Reprocessing Plant--During 1984 /the advance on the critical path of the project was zero,/ which means adding another year to the delay in completion. If the budgetary delays experienced in 1984 continue in 1985, /the CNEA will not be in a condition to provide the equipment required for continuing with the installation to the contractor of the project (TECHNINT)./

Enrichment Plant--The controversial installation of Pilcaniyeu (Rio Negro near Bariloche), should complete its first phase--which represents 15 percent of the project--in 1985, thus attaining a /production capacity of 500 kilos per year of 20 percent enriched uranium,/ for the manufacturing of fuel for reactors producing radioisotopes and for experimentation and training.

Amortization of the Debt--Refinancing of the /short-term debt/, which amounts to \$538.4 million, and /which was completely included in the 1984 budget but was not accomplished/ is pending.

8908

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ARGENTINA

RISKS RESULTING FROM SETBACK TO NUCLEAR PLAN DISCUSSED

Buenos Aires ARGENTINE NEWS in English 8 Jul 85 pp 51-54

[Article by Maria Teres Ronderos]

[Text] It was in Chicago in 1942 that a nuclear reactor was placed in operation for the first time. Only eight years later, Argentina made the crucial decision to make nuclear energy one of the essential pillars of its development.

"For a country today to have nuclear technology is similar to what it might have been for a primitive tribe to have learned how to make fire," said the president of one of the local nuclear engineering companies.

Despite internal political turmoil, increasing economic difficulties and mounting international pressure, Argentina has achieved, in the last 34 years, substantial technological development in nuclear energy. It is, perhaps, the only field in which this country has nearly breached the technological gap with the industrialized world. However, due to the present deep economic crisis, the Argentine nuclear project is now seriously threatened.

Since 1982, the rate of growth in the nuclear energy sector started to diminish, according to Jorge Cosentino, an adviser of the National Atomic Energy Commission (CNEA)—a state agency created in 1950 which regulates and directs all nuclear energy-related activities in the country.

"In 1980, a peak year in nuclear energy development, the CNEA had a budget of around US\$ 900 million," Cosentino says.

The 1984 budget is less than US\$ 420 million.

Last year the situation worsened considerably for the CNEA, as it received, at constant values, only 30 percent of the original funds it was assigned in the budget, according to Argentine Nuclear Technology Association (AATN) sources. As a consequence, the CNEA has a debt of about US\$ 100 million with private suppliers and engineering companies and was unable to pay almost US\$ 90 million in overdue interest.

According to Martin Yriart, *Ambito Financiero's* specialist on nuclear energy, "the CNEA will receive 50 percent of the funds established in the 1985 budget."

For CNEA president Alberto Constantini, such a financial shortage in the nuclear industry is just part of the general crisis that affects the whole country. "Let's face it," he told *Argentine News*, "Argentina is in crisis and the sophisticated character of our business does not save us from it."

Indeed the crisis has seriously affected what has been known as the Argentine Nuclear Plan.

This plan originated in a 1977 decree (3183) that defined long-term objectives and policies framing the development of nuclear activities in the country. It established that 1) nuclear energy should be used instead of other energies when proved convenient; 2) integral self-sufficiency must be achieved in the nuclear field; 3) all peaceful forms of nuclear technology must be developed and 4) people and environment must be protected from nuclear-originated harmful effects.

Decree 302 of 1979 approved a complex nuclear program which established the creation of 4 nuclear power stations and of related industries. In order to meet demands of both 1977 and 1979 decrees, the CNEA expanded its activities to cover six basic fields: 1) Nuclear power stations, 2) Nuclear power station supplies, 3) Radiation and radioisotopes, 4) Radiological protection and nuclear security, 5) Research and development and 6) Planning and other administrative aspects.

The creation of 4 nuclear power plants constituted the core of the Argentine Nuclear Plan. Apart from these, two other plants are already functioning: Atucha I (110 km from Buenos Aires) and Embalse (at Rio Tercero, Cordoba). Both are natural uranium-heavy water units with 340MW and 600MW capacities respectively. Atucha I came on stream in 1974 and Embalse in 1984.

The 4 nuclear power plants were, according to the plan, scheduled to begin producing electricity in 1987, 1991, 1994-95 and 1997. The idea was to gradually increase participation of national science, technology, engineering and industry, so that the last one would be over 80 percent Argentine made.

Following the plan then, the third nuclear power plant, a 745MW, pressure-vessel heavy water reactor, Atucha II was contracted in 1980. The public bidding was won by Kraftwerk Union, AG (KWU), a German company owned by Siemens.

However, unlike Atucha I, which was contracted with KWU on a turnkey basis--that is, totally made under KWU directions and technology and with only 33 percent national industry participation, supplying mostly civil work--Atucha II's main architect and engineer is the Empresa Nuclear Argentina de Centrales Electricas (ENACE), whose capital is 75 percent CNEA's and 25 percent KWU's.

Also, there is a technology transfer contract between KWU and ENACE which includes intensive training services both here and in West Germany. The percentage of KSÜ's shares in ENACE will be progressively reduced to zero by 1990. According to the plan, ENACE would build all nuclear power plants in Argentina, while KWU must offer Argentina participation in any public bidding it competes in as in Latin America.

"I believe we won the contract, although we offered higher prices because of, first, the perfect functioning of Atucha I--which by the way, is ranked as one of the top ten in the world in availability--and second, problems the CNEA had with the Canadian-Italian consortium AECL-IT in the construction of Embalse," says Erhard A. Gaedtke, general representative of KWU in Argentina.

According to Gaedtke, these problems lay in the different management styles of Germans and Canadians. "When we build a reactor we are the general managers. We sub-contract other industries but we are ultimately responsible. Canadians work as one partner more, together with other different companies, and contract a consulting firm to coordinate all parts involved," he says.

Due to the CNEA's budget and funds flow problems, Atucha II will not be finished as scheduled in 1987. "Atucha II has been delayed since 1982 and is now 3 and a half years behind," says CNEA president Constantini. Also, because of unproductive costs and high interests due to high local financial costs, the plant which was budgeted to cost US\$ 1.5 billion could end up costing US\$ 4.5 billion or even more.

However, both CNEA and private industry sources agree that this setback is due to the general crisis of the economy rather than to an intentional government policy.

With the delay of Atucha II, the other projected nuclear power stations will also be held up. Thus, the feasibility study for the 4th nuclear plant and crucial decisions such as whether the reactor will use pressure-vessel systems (German type) or tube-pressure systems (Canadian type) have been paralyzed.

Although Energy Secretariat officials had originally said that Atucha II would be needed to supply electricity by 1991 at the latest, however, recent estimates tend to demonstrate that because of the economic recession, power demand will have little growth and thus, there will not be a significant power shortage if Atucha II enters the system a year or two late.

Nevertheless, many other projects that were started in order to achieve the basic goal of the Nuclear Plan--self-sufficiency in the production of all supplies needed to operate the reactors (activities which cover the whole fuel cycle)--have also nearly ground to a halt. This means that not only will the desired technological independence in this field be postponed in time, but, as Consentino says "the rest of the world will not wait for Argentina to recuperate in order to develop their nuclear technology. The risk that our technology will become backward in the meantime is high."

A fuel cycle for a natural uranium-heavy water nuclear reactor starts with prospecting and mining of uranium. Argentina has 31,000 tons of reasonably assured reserves of U_3O_8 . Most of these are found at "Sierra Pintada" in the province of Mendoza. Uranium ore is exploited and then concentrated into what is called Yellow cake. There are two concentration plants that use a method known as heap-leaching: Don Otto (Walta) and Los Adobes (Chubut).

Also, two other concentration mills are functioning at Sierra Pintada and Malargue (Mendoza), all operated by the CNEA. Total Yellow Cake production is 220 tons per year.

A black powder, uranium dioxide (UO_2) is then produced from the yellow cake at the Cordoba Factory Complex. Small uranium pellets are made from the UO_2 . These constitute the basic fuel with which the fuel elements that are to be burned in the nuclear reactor are made. Pellets are put into zircaloy tubes, which are in turn put together in groups to form a fuel element. A pilot plant for production of fuel elements has successfully produced and tried them.

According to an article on the Argentine Development Plan published in Nuclear Engineering International, 240 elements are presently in use at Atucha I with no problems.

An industrial fuel fabrication plant at the Ezeiza Atomic Center under the management of Combustibles Nucleares Argentinos (CONUAR) was inaugurated in 1982. CONUAR--partly owned by CNEA--acquired domestic and KWU technology and now supplies Atucha I and Embalse.

However, for fuel elements to be totally domestically produced, an industrial Zircaloy tube-manufacturing plant was set up at Ezeiza Atomic Center and it has already produced 1000 meters of tubing, according to Alejandro Placer, planning, coordination and control director of CNEA and author of an article "El Plan Nuclear" published by the Argentine Project Council, an organization that promotes integral national development.

It was also considered necessary to develop the technique for the extraction of zirconium, the raw material with which zircaloy is made, since there is plenty in Argentina, and yet the country has to buy it from either of the only two companies in the world that produce it.

A pilot plant was set up at the Bariloche Atomic Center in order to develop the extraction technique and now an industrial plant is under construction.

Finally, these fuel elements, once irradiated, go to decay pools.

The fuel-making process described above constitutes only what is known as the "open fuel cycle." For it to be closed, the spent uranium fuel elements which contain Plutonium (Pu_{239}) as a waste product can be reprocessed by extracting the Pu and using it together with the uranium to make new fuel elements with improved efficiency. A pilot reprocessing plant is under construction at Ezeiza atomic center.

Another key element in the operation of a nuclear power plant is the heavy water. Presently, both 2-ton-per-year pilot plant and a 250-ton-per-year industrial plant are under construction. The latter is being built at Arroyito (Neuquen) by the Swiss firm Sulzer Brothers, which signed a turnkey contract with CNEA.

Also as part of the plan for self-sufficiency a uranium enrichment (process by which the concentration of Uranium₂₃₅, a fissionable isotope in natural uranium, is increased), is being built in Pilcaniyeu (Rio Negro) by INVAP (Investigaciones Aplicadas)—a firm jointly owned by Rio Negro province and the CNEA. Enriched uranium is needed for research reactors (RA), one of which functions in Bariloche (RA₃) and another at Ezeiza (RA₆).

In order to fulfill the objective of increased national participation of this complex nuclear plan, the national industry was called on by the CNEA to join forces so that they could develop the sophisticated technology required for this commitment. Two large nuclear engineering pools formed by most engineering companies in the country were created: Nuclear and Argatom.

Later Techint, which was originally part of Nuclar, separated to create its own nuclear engineering department.

These firms, which together with other engineering, electromechanical and assembly industries received CNEA and foreign training and invested large amounts of capital to acquire technology and machinery needed to satisfy the nuclear plan demands. All have participated in the engineering design, in the making of electromechanical parts and in assembly and civil works.

As a consequence of the economic crisis which caused delays in Atucha II, the Arroyito heavy water plant, the reprocessing plant at Ezeiza and postponement of other projected works (breeder reactor, other nuclear power stations, etc), companies have been negatively affected, losing human resources and, until recently, paying extremely high financial costs because of local market conditions.

"We have about 10 percent of the people we had before," says Admiral Oscar A. Quihillalt, president of Nuclar and the CNEA's president for almost 18 years.

"We reduced our personnel by 60 percent," says Techint's nuclear department director Raul Boix Amat, "and we are making a great effort to maintain a research and development team, as well as a minimum infrastructure in order to be able to grow when the country's situation improves."

"We maintained most of our operator engineers until last month, but then, we had to let them go," says Argatom's Admiral Raul Fite.

All sources agreed that the problem with losing highly skilled workers and professionals lies in the fact that it is very hard to recover them once business starts to pick up again. Either they go abroad or they move to other less sophisticated fields (steel mills, petrochemicals, etc) and thus, are bound to forget their training as time passes.

"We have grade one welders, who have taken at least 5 years to achieve such skillfulness working on ordinary welding jobs so that we do not lose them," says German Bensadon of Industrias Metalurgicas Pescarmona (IMPESA), which has around 60 million dollars in nuclear contracts.

Other CNEA non-power related activities such as radiation sealed sources and radio isotope production, with vast uses in medicine (261 nuclear medicine centers in the country have been set up and are supplied by the CNEA), agriculture and food-related industries, as well as research and development projects such as the installment of a 20 MW electrostatic accelerator as a basis for a National Research Laboratory, will probably also be reduced as a result of budget reductions and funds shortage. Nevertheless, government officials have said that these projects will have preference with respect to other more costly power plans.

Although it is true that the most important cause of current difficulties faced by nuclear industry in the country originate mainly in the economic crisis, experts from CNEA and in the private industry say that there are also structural problems, related to organizational failures inside the CNEA and how it relates to other institutions, they also say there is a lack of clear, updated laws which regulate the industry.

"There have been basic structural problems in the nuclear sector since 1968—a turning point, as it was then decided to build the first nuclear power plant in Argentina—when the CNEA stopped being just a small research center and started to increasingly play industrial and management roles," says the CNEA's Consentino.

He and other experts agree that the maintaining of nuclear knowhow and the achievement of technological breakthroughs are not possible via research alone. They required industrial application.

"Research alone runs the risk of having its budget cut very easily, since no concrete output is seen," Nuclar's Quihillalt adds.

Recently appointed by the Alfonsín administration, CNEA president Costantini also believes that the nuclear sector needs reorganization, primarily because "CNEA authorities and local industry took shelter under the umbrella of the sophisticated character of nuclear energy and the sensitivity of radioactive material used, in order to ignore the basic laws of gravity (Buy National, Book Keeping law, etc.) that regulate public works. The nuclear energy sector was 'working on the moon,' outside these 'laws of gravity.' Now we need to come back to earth."

For Techint's Boix Amat, who is also president of AATN, while it is true that ordinary laws were at times ignored because of the nature of the nuclear plan, what ought to be done is to create new legislation that gives special treatment to this and other sectors that require enormous resource concentration—monetary, technological, human.

"These old laws were drafted for a state which didn't venture into these sophisticated public works," he says, "and thus, they must be adjusted to suit a new reality."

The Radical government, probably realizing the need to reorganize and regulate nuclear activities, issued decree 159 in 1983, creating a commission made up of the presidential secretary general, the foreign minister and an adviser and instructing it to come up with a series of recommendations within 6 months that would serve as a reference for the nuclear industry. I was also to establish the main points of a nuclear law that would be presented to Congress for discussion and approval.

Nevertheless, the commission has not yet finished its work and thus, the Nuclear Law which would set new objectives, given current economic restrictions, is yet to be defined.

A source who preferred not to be mentioned, said that the government is slow in dealing with this matter partly because it is under great pressure from the United States and other nuclear powers.

Despite the fact that all Argentine governments have repeatedly stated that they pursue the development of nuclear energy technology solely for peaceful ends, the country has been classified by experts in the developed world as a "phantom proliferator" together with India, Pakistan, Israel, South Africa and Brazil, according to Time magazine. This is basically because these countries have refused to sign the Non-Proliferation Treaty--sponsored by the United Nations and signed by over 100 countries. The treaty will expire in 1995.

"Argentina hasn't signed the NPT not because it wants to produce weapons, but rather because it is interested in seeing that the nuclear powers which signed it really reduce their nuclear arms and share the technology with other countries for peaceful ends, which is what the NPT actually states," says Boix Amat.

According to Costantini there are no strong pressures on Argentina to sign the NPT or the Tlatelolco agreement--banning nuclear weapons in Latin America--because for every exported and imported nuclear item Argentina signs the International Atomic Energy Agency's safeguards.

Other experts point out, however, that there are two basic reasons why the nuclear powers want Argentina to sign these agreements. One is strategic: they want to make sure every one understands they are "the boss," and also they are genuinely concerned that a politically unstable country might develop and eventually use the atomic bomb. The other has to do with maintaining the knowhow of a source of energy that could in the XXI century become as much a key as oil has been for this century, some observers say.

Their purpose in keeping control of the technology, the observers say, has been clearly seen in concrete examples. According to IMPSA's Bensadon, when the US-based corporation Westinghouse invited Argentine industry to

participate in the public bidding for a nuclear reactor in Egypt, the US Congress prohibited it from doing so. Also, as the CNEA's Placer relates "when the CNEA wanted to buy heavy water, it had no problem; but when it wanted to buy a heavy water plant to locally produce the heavy water and not depend exclusively from external supply, it was unable to do it. Then the CNEA developed heavy water technology and when it was known that Argentina had achieved this technology on its own, and the CNEA opened a tender for an industrial plant. Then to its surprise, or not really, it received three offers."

Something similar happened when the CNEA wanted to buy fuels. A supplier agreed to provide the technology but later changed its mind because of political pressures.

What can Argentina do to keep its nuclear plan despite economic shortages, structural problems and international pressure?

There are basically three ways out, experts say: exports, finding new financing possibilities, and restructuring and regulating the CNEA and its relations with other industries.

In the first field, exports, Argentina already has a start. The CNEA is building the Peruvian Atomic Center in Huarangal, near Lima, which has a radioisotope-producing reactor and plant and includes the national Laboratory of Radiological Protection and Security. Most of the national industries are participating in this construction and thus, it has served as an outlet, as domestic activities contract.

Also the CNEA built a research reactor RP10 for training Peruvian personnel.

In May, the Foreign Ministry announced an agreement with Algeria for the construction of a research and training reactor similar to the RA₆ presently functioning in Bariloche--a 500KW reactor with fuel elements made in the country with 20 percent enriched uranium--and for cooperation in production and use of radioisotopes in medicine, industry and agriculture.

Similar cooperation agreements have been signed with China, Egypt and most Latin American countries, Argentina has also exported raw materials or elaborated elements needed in the fuel cycle. An example is provided by a contract signed with Brazil to export 160 kilometers of Zircaloy tubing. Private industries are actively seeking export outlets, given the local recession.

Perhaps one of the most crucial limitations to Argentina's capacity to export nuclear facilities is the restrictions it meets in financing such huge projects. Countries which open public bidding for large-scale industries generally demand good financing as well as low costs.

The second possibility, that is, to acquire international credit, holds little probability given the difficulty Argentina is already having in paying its burdensome debt and in getting any cash money to come in.

"We must reorganize the sector and establish long-term objectives, 20 to 25 years ahead," says Boix Amat.

For Cosentino, the only way out is to "have clear ideas on what to do, adjusting 1977 and 1979 objectives in time and with respect to world technology." Most sources agree that a general view of what the future should be must be reached before a financial scheme that takes into account the current critical moment can be designed.

Finally, both the government and private industry must come up with a comprehensive Nuclear Law that settles once and for all the old structural problems of the CNEA and its relations with society.

Meanwhile, the consensus in the industry is that nuclear energy is going to be the backbone of energy in the future, and that Argentina must use this moment of economic restraint to prepare itself for the time of prosperity to come in the next century.

CSO: 5100/269

ARGENTINA

BRIEFS

ATUCHA II BIDS ANNOUNCED--Preliminary bids are being received at the headquarters of Argentine Nuclear Enterprise for Electric Powerplants ENACE in the competition for the selection of the groups of firms that will perform the engineering work on the piping for the Atucha II Nuclear Powerplant. Bids were presented by the following firms and groups: Group I, consists of Esin Consultora, Consulbaires and Sener Ingenieria y Sistemas; Group 2 includes Franklin Consultora, Inconas, Latinoconsult and Electrowatt; Group 3 made up of Electrosistemas, Consultora Coa, IATASA and Ebasco; Group 4 is made up of Consultora O. Grima, Tool Research Argentina and Empresarios Agrupados; Group 5, Ferrostaal Argentina, Manferro and Tecnova; Group 6, Atec and Astra, and Group 7 includes Argatom and Agatom Ingenieria y Construcciones. The firms Techint and Nuclar presented themselves individually. [Text] [Buenos Aires ENERGEIA in Spanish No 52 p 12] 8908

CSO: 5100/2136

BRAZIL

PROCEEDINGS OF PUGWASH MOVEMENT MEETING IN SAO PAULO

Chinese Delegate on Nuclear Capability

Sao Paulo FOLHA DE SAO PAULO in Portuguese 3 Jul 85 p 24

[Text] Campinas--At 2000 hours today in Campinas (located 98 kilometers from Sao Paulo), Science and Technology Minister Renato Archer will preside over the formal opening ceremony of the 35th Annual Meeting of the Pugwash Movement. The meeting, which will be held at the Cultural Center and the Carlos Gomes Institute of that city and last until the 8th, will bring together 110 scientists from all over the world for discussions on and suggestions for world peace and disarmament.

Among the participants at the meeting are: the winner of the 1964 Nobel Prize for chemistry, Dorothy Hodgkin; the vice-chairman of the People's Political Consultative Conference, Zhou Peiyuan; scientist I. Shokilov of the Soviet Academy of Sciences; public health specialist of the University of Pennsylvania, Martin Kaplan; and nuclear energy researcher of the University of California, John Holdren.

The scientists will meet in restricted session for 5 days and at the end of the meeting they will collate the proposals approved in a document to be forwarded to all the chiefs of state in the world as well as international organizations.

Speaking to the press yesterday in the name of the Chinese delegation, the vice-chairman of the People's Political Consultative Conference and doctor of physics, Zhou Peiyuan, supported the position that the countries of the so-called Third World, such as Brazil and Argentina, should develop nuclear energy technology "if they feel the need to have it for peaceful purposes."

In his opinion, that is a way of "breaking the monopoly of the two superpowers: the Soviet Union and the United States." Zhou Peiyuan, 70 years old, justified China's first atomic explosion, which occurred in 1964, "along that line of thinking, namely, as a way of breaking the nuclear monopoly."

However, Peiyuan considers the outbreak of a nuclear conflict unlikely, with the argument that the country that plunges the world into a nuclear holocaust

will inevitably be involved in it because we all know that after the explosion would come the nuclear winter and the nation that started it would suffer the consequences."

With regard to the discussion about nuclear disarmament, Zhou Peiyuan considers that the nations should deal with that topic only after the two superpowers begin the curtailment of tests and the withdrawal and destruction of weapons "because they are responsible for 95 percent of those weapons."

Soviets on 'Star Wars' Danger

Sao Paulo FOLHA DE SAO PAULO in Portuguese 4 Jul 85 p 29

[Text] Campinas--The 35th Annual Meeting of the Pugwash Movement opened yesterday in the Cultural Center of Campinas with the participation of more than 100 scientists from various countries. The meeting will last until next Monday and the center of its discussions are the problems of peace and disarmament on a world scale. The discussions will be held in restricted session and the proposals to be approved are to be forwarded to all the chiefs of state in the world.

The movement, which embraces scientists of different nationalities, was born immediately after the explosion of the second atomic bomb in Japan in 1945, being officially launched in London in 1955 by a group of scientists on the basis of a document prepared by them in the small city of Pugwash, Canada.

Among the scientists present are: Dorothy Hodgkin, winner of the Nobel Prize for molecular chemistry in 1964 and president of the movement; Joseph Rotblat, a scientist specializing in atomic energy, from the University of London; Klaus Gottstein, director of the Max Planck Institute; Maciejz Nalecz, of the Polish Academy of Sciences; the several Soviet scientists.

The participants will be divided into five working groups with specific topics. In addition to that, a general topic on North-South and East-West relations will be discussed by all of them.

Yesterday, the Soviet scientists who are participating in the 35th Annual Meeting of the Pugwash Movement sought to stress the dangers represented by the "Star Wars" project in the event that the U.S. Government decides to proceed with it. According to the specialist in military problems and member of the academy of Sciences of Russia, Ladislav Micharin, 53, "the project would demobilize the whole process of negotiations on nuclear and strategic disarmament underway."

In the opinion of Anatoliy N. Glinkin, 56, a specialist in Brazilian history and chief of the Department of Latin American History of the Russian Academy of Sciences, "the efforts of the Soviet Government and scientists are directed at not permitting the militarization of space."

Brazilian-Argentine Pact Urged

Sao Paulo FOLHA DE SAO PAULO in Portuguese 6 Jul 85 p 21

[Text] Campinas--Yesterday, on the second day of the proceedings of the 35th Annual Meeting of the Pugwash Movement in Campinas, physicist Luis Pinguelli Rosa, 43, professor of the Federal University of Rio de Janeiro, advocated the urgent need for the signing of a bilateral Brazilian-Argentine agreement, with technological cooperation in the nuclear field and a commitment by those two countries not to build an atomic bomb.

Pinguelli Rosa expressed the fear of the nuclearization of all of Latin America in the event that Brazil and Argentina continue to follow the courses pursued until now to build the atomic bomb within an average period of 5 years. In the opinion of the physicist, despite the historic rivalry that surrounds them, those countries must realize that there is still time to decide not to build the atomic bomb because of the simple fact that "having the bomb automatically means being the target of another nuclear bomb."

Responsibility and Politics

Concerned about the prospect of construction of a Brazilian bomb, physicist Pinguelli Rosa said that the Brazilian political parties have not assumed the political responsibility of expressing themselves clearly on the nuclear issue. "In Brazil, the political parties are shortsighted, incapable of discussing the issues that emerge from the political structure of power."

With regard to the Brazilian Government, Pinguelli Rosa said that for reasons of principle, it should always express itself against the atomic bomb, and he found odd President Jose Sarney's recent statements to the world press, when he said that Brazil is not developing technology aimed at the atomic bomb.

According to the physicist, this statement by President Sarney is "mistaken," inasmuch as the minister of the navy himself, Henrique Saboya, has already stated that a nuclear submarine is in the process of development in Brazil the technology of which is much more sophisticated than the atomic bomb itself.

"Everybody knows that Brazil has a parallel nuclear program underway by the navy and aeronautics," observed Pinguelli Rosa, who believes that this fact cannot be omitted when one speaks about technology for the construction of the atomic bomb. On the other hand, the physicist praised the position of the president of the republic for telling the foreign reporters during the same interview that the Brazilian-German nuclear agreement is not a priority of the government of the "New Republic."

The meeting of the Pugwash Movement, which includes scientist supporters of peace and world disarmament from various countries, will continue until Monday and should approve proposals in that regard to be forwarded to all chiefs of state in the world.

Soviet Decries Space Militarization

Sao Paulo FOLHA DE SAO PAULO in Portuguese 8 Jul 85 p 14

[Text] Campinas--The 35th Annual Meeting of the Pugwash Movement, which has been in session since last Wednesday and brought together more than 100 scientists from 60 countries to discuss proposals designed to aid disarmament and world peace, will close in Campinas today. At the end of the proceedings, a document will be prepared containing the resolutions of the meeting, which is to be forwarded to all the chiefs of state in the world.

On Saturday, Soviet lawyer Valdislav Misharin, a specialist in international law directed at nuclear disarmament blamed the United States for the dangers of a nuclear war in not accepting the Soviet Union's proposal to freeze nuclear weapons.

According to the specialist, the space arms race could break the current framework of strategic control and stability between the two superpowers because it is impossible to foresee the consequences in space, which hampers any negotiations between the two countries. In the opinion of the Russian specialist, in addition to being very expensive, nuclear weapons are veritable "white elephants."

Disastrous Results

The Israeli physicist, Shalheveth Freier of the Weizmann Institute and former director of the Israeli Atomic Energy Commission, declared that the nuclear confrontation between the two superpowers entails disastrous results for the rest of the world due to the involvement of those countries with the other nations, including in case of war. Freier does not believe the Americans or Russians want nuclear war but observed that the two superpowers "are prisoners of their double fears." According to the physicist, "in order to resolve this conflict, successive meetings are necessary between the two countries, having as their goal the good of humanity."

World Peace Manifesto Issued

Sao Paulo FOLHA DE SAO PAULO in Portuguese 10 Jul 85 p 19

[Text] Campinas--In a six-page document entitled, "East-West Conflicts and the Third World; Interrelations and Implications for Peace," issued at the conclusion of its 35th annual meeting held in Campinas last week with the participation of 130 scientists from 60 countries, the Pugwash Movement expressed its concern over the fact that the United States and the Soviet Union are unable to stop the arms race, contributing to other countries also becoming nuclear powers. The Pugwash Movement, begun 35 years ago in the city of Pugwash, Canada, has about 1,000 active members, the majority of them scientists, who fight for peace and nuclear disarmament. The next meeting will be held in 1985 in Budapest, the capital of Hungary.

This year's Pugwash Movement document gives greater emphasis to the problems of the Southern Hemisphere. It calls Brazil and Argentina to task for not having signed the treaty on the nonproliferation of nuclear weapons and for

not adhering fully to all the provisions of the Tlatelolco Treaty. The members of the Pugwash Movement sent copies of the document to the leaders of all countries, including President Jose Sarney. The document also calls for preventing the militarization of space and broadening the measures to restrict and control chemical warfare, in addition to supporting the Contadora Group and attacking apartheid in South Africa.

The movement sent a telegram to U.S. President Ronald Reagan and the leader of the Soviet Union, Mikhail Gorbachev, in which it congratulates the leaders of the two countries for having scheduled another meeting in Geneva in November of this year to discuss nuclear disarmament. In the telegram, the members of the Pugwash Movement ask the leaders of the two superpowers to take into consideration not only the specific problems of the United States and the USSR but also the problems that affect the other regions of the world.

8711

CSO: 5200/7

BRAZIL

CTA HEAD CALLS BOMB PRODUCTION POLITICAL DECISION

Sao Paulo FOLHA DE SAO PAULO in Portuguese 6 Jul 85 p 6

[Article by Dalton Moreira]

[Excerpts] Taubate--By the end of 1986, the Aerospace Technology Center (CTA) in Sao Jose dos Campos, 97 km from Sao Paulo, is scheduled to place the first 30 Piranha air-to-air missiles on the national market. Beginning in 1987, arrangements will be made to market them in other countries of our continent and of Europe. Each missile will cost \$100,000.

This information concerning the "Piranha"--the first air-to-air missile manufactured in Brazil--was given exclusively to our newspaper by Brig Gen Hugo de Oliveira Piva, director of the CTA, 58 years of age. He also stated that the missile project was begun in 1976 but was "temporarily shelved from 1977 to 1982 due to financial difficulties." The total sum to be invested in the project was not revealed by the organization's director.

Atomic Bomb

Hugo Piva also stated that Brazil is able to have its own atomic bomb, since it is mentioned by "various international publications as being a country capable of doing so." In his opinion, "in the future Brazil will be able to build its own atomic bomb. It is a question of a political decision. I believe--this is a personal opinion--that if Brazil called all its scientists together, we would be able to build it. Until now, no political decision has been made in this regard."

As to information that the Institute for Advanced Studies (IEAV), CTA's newest subsidiary organization, is already developing the Brazilian atomic bomb, Hugo Piva said that "this is a lie"; but he did admit that the basic research being conducted by the IEAV scientists in support of Brazil's nuclear energy program could lead to the "enrichment of uranium."

8568

CSO: 5100/2159

BRAZIL

NUCLEAR STUDY COMMITTEE TO BE ESTABLISHED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 24 Jul 85 p 21

[Text] The minister of Mines and Energy, Aureliano Chaves, yesterday forwarded a proposal to President Jose Sarney for the creation of a high-level commission to evaluate and propose recommendations for the future of the Brazilian nuclear program with 120 days after it is installed.

The Brazilian nuclear program is one of the most important differences between Minister Aureliano Chaves and Planning Minister Joao Sayad. The latter advocates its complete suspension while the minister of mines and energy concurs in postponing a decision on the construction of the two Sao Paulo plants, Iguape-I and II, for after 1988 but wants to maintain the Angra-III nuclear plant project, even at a slower pace.

Participating in the commission will be representatives of other ministries connected with the area and of the scientific community who are going to prepare a report with input for President Sarney's decision on the extent, the pace of implementation and policy for the sector.

The commission will study the activities carried out by the National Nuclear Energy Commission (CNEN), the regulatory agency of the program, and the Brazilian Nuclear Corporation (NUCLEBRAS) holding company and its subsidiaries. Also to be discussed will be the participation of nuclear energy in meeting the national energy demand in the short, medium and long terms. It will also promote a broad public effort to clarify the scientific, technological, economic, social and environmental impacts of the peaceful use of atomic energy.

The chairman of the National Oil Council (CNP), General Roberto Franca Domingues, signed an order yesterday raising by 40 percent the prices paid to the producer of national anthracite coal. The order does not meet the demands of the coal producers of Santa Catarina, who requested the revision of the system of granting subsidies for the transportation of that mineral from the mine to the consuming centers. A subsidy was maintained which ranges from 30 to 40 percent of the coal transportation price without considering the actual cost of that transportation, which is much greater for Rio Grande do Sul coal than for Santa Catarina coal.

8711
CSO: 5100/2157

BRAZIL

SETUBAL REASSURES ARGENTINA ON ATOMIC BOMB

PY080031 Rio de Janeiro O GLOBO in Portuguese 5 Sep 85 p 6

[Excerpts] The Brazilian Government has decided to close five consulates because their maintenance is not justified by the services they provide. The consulates are located in Naples, Italy; Istanbul, Turkey; Rosario, Argentina; Gdynia, Poland; and Monterrey, Mexico. This information was given by Foreign Minister Olavo Setubal during an appearance before the Senate's foreign relations committee yesterday.

As for Cuba, the foreign minister explained that the Security Council is studying the possibilities for resumption of diplomatic relations, and said that the council members' votes are being gathered to prepare the final report that will be submitted to President Jose Sarney.

Minister Setubal once more condemned the practice of apartheid in South Africa, and concluding his address to the Senate's Foreign Relations Committee, he said that he had to personally call his Argentine counterpart Dante Caputo to assure him that Brazil was not thinking of manufacturing an atomic bomb. He added that on this question Army Minister Leonidas Pires Goncalves had released an official note through the Army Social Communication Center.

CSO: 5100/2176

BRAZIL

ARMY MINISTER SAID TO FAVOR BUILDING ATOMIC BOMB

EFE Report

PY022211 Madrid EFE in Spanish 1431 GMT 1 Sep 85

[Text] Brasilia, 1 Sep (EFE) -- Brazilian Army Minister General Leonidas Pires Goncalves has said in a meeting with important congressmen that Brazil ought to build an atomic bomb.

Tarcisio de Holanda, political editor of the newspaper CORREIO BRAZILIENSE, today published part of the geopolitical analysis made by the Army minister a week ago during a trip to Rio de Janeiro with a group of senators and deputies. The newspaper article states that Gen Pires Goncalves had asked for the congressmen's support, mainly for that of Ulysses Guimaraes, president of the Chamber of Deputies, so that Brazil could continue developing its nuclear industry until it can fully harness nuclear technology.

Minister Pires Goncalves revealed on that occasion that Brazilian intelligence services had learned of the intention of former Argentine President General Leopoldo Galtieri to invade Rio Grande do Sul and recover territory claimed by Argentina. Minister Pires Goncalves said that Argentina is Brazil's main regional competitor in the field of nuclear research because it has maintained a permanent nuclear policy over the last 25 years, according to the newspaper report. Minister Pires Goncalves told the congressmen that Brazil should develop its nuclear industry only for deterrence and to prevent the Brazilian Armed Forces from remaining at a disadvantage in case of a military conflict.

According to Pires Goncalves, Galtieri's government had the intention of solving not only the Malvinas conflict through military means, but also the Beagle conflict with Chile and the conflict over territories in Rio Grande do Sul. He stated that Argentina could deploy in a short time only 800,000 men, while Brazil could summon up to 2 million men in a month. The newspaper article states that the Argentine forces could penetrate 180 km inside Brazilian territory and stop at what Brazil calls the "B" Line in Rio Grande do Sul. Gen Pires Goncalves said that Brazil has an advantage in numbers and in quality. He said Brazil can deploy large numbers of men and it has an important military industry that includes the manufacture of missiles and airplanes.

Minister Pires Goncalves told the congressmen that there currently is no border problem with Argentina. However, he admitted that the current major problem is the presence of 300 Brazilians in the fertile Beni Valley in Bolivia, which could turn into a conflict area at any moment, the newspaper states. Gen Pires Goncalves has expressed satisfaction with the current status of diplomatic relations with Argentina, mainly after the installation of a civilian government there, and he is willing to strengthen ties with that

government. Pires Goncalves has insisted that because of its technological development, Argentina might try out an atomic bomb at any time.

Ministry Denies Pires' Statement

PY030334 Paris AFP in Spanish 2243 GMT 2 Sep 85

[Text] Brasilia, 2 Sep (AFP) -- The Army Ministry today denied a press report that Army Minister General Leonidas Pires Goncalves supports the building of an atomic bomb to intimidate any potential aggressor. The report published by the Brazilian daily CORREIO BRAZILIENSE on 1 September said the Army Minister supported the building of an atomic bomb during a lecture before a group of Brazilian congressmen last month in Rio de Janeiro. In an official communique released tonight, the Army Ministry said that General Pires Goncalves never discussed during the meeting the issue reported by the newspaper. The communique said that during the meeting, the minister had recalled that mastery over the entire nuclear fuel cycle does not necessarily lead to the manufacture of devices for military use, and that after that know-how has been obtained, the will of the nation and the political decision of the state will determine its application in the future. He also said Argentina had only been cited as an example of a country which has reached approximately the same technological development level as we have. It has maintained in recent years a commendable effort in the nuclear field, and made significant progress that had already been reported to the international community.

According to CORREIO BRAZILIENSE, Gen Pires Goncalves told the congressmen that Argentina is already in a position to build an atomic bomb at any time, and that should it decide to do so, the Brazilian political leaders will have to apportion resources for the manufacture of an atomic bomb for the purpose of intimidating any potential aggressor. The newspaper report also indicated that the Army minister had said that Brazil is not afraid of a military aggression, but that it cannot afford to weaken its bargaining power if a neighbor such as Argentina should build an atomic bomb.

The communique released tonight by the Brazilian Army Ministry also said the ministry deplores that such a delicate question regarding relations with friendly countries had been sensationally treated by a newspaper.

CSO: 5100/2171

BRAZIL

CNEN SAYS NUCLEAR PROGRAM MEETS MILITARY PURPOSES

PY052124 Sao Paulo FOLHA DE SAO PAULO in Portuguese 3 Sep 85 p 4

[By Brasilia correspondent Paterson Pereira]

[Text] Despite the Brazilian Government's denials, especially those by Army Minister General Leonidas Pires Goncalves, that no thought is being given to the manufacture of nuclear weapons, the National Nuclear Energy Commission (CNEN) has revealed, in a document obtained by FOLHA, that "some technologies developed for peaceful ends are necessary for developments in the military field."

The document prepared by the CNEN, which falls under the Mines and Energy Ministry, affirms that "in the ministry's area," all nuclear activities, whether in production or research, are directed toward peaceful ends. It explains: "The government believes that it is not fair to obstruct the development of technologies that can be beneficial for the whole of Brazilian society only because some of them can be used in projects of a military nature." The document, however, notes that "these technologies and materials are not sufficient for an immediate application in military weapons."

The revelations made in the document may indicate the strategy the government has adopted since a nuclear agreement was signed with the FRG on 27 June 1975: Never admit that these technologies could be used for military purposes in order to fend off the great international pressures that would be exerted against the agreement, despite its peaceful objectives. Those pressures would have been unpredictable against an agreement for military purposes.

Mines and Energy Minister Aureliano Chaves, 56, has denied that the Brazilian nuclear program is being developed for military purposes, and has reiterated the peaceful objectives of the program. CNEN President Rex Nazare Alves has said the same thing, and added that it is not possible to use some of these technologies for military purposes.

However, Paulo Richer, secretary general of the Mines and Energy Ministry, 58, has admitted that some technologies used in the Brazilian nuclear program could be used for military purposes, especially in manufacturing an atomic bomb. The CNEN document does not specify what type of technology in the nuclear program can be used for military purposes, but according to Richer, the uranium enrichment process is one of them. Uranium 235 (which is fissionable) is found in its natural state with only 0.7 percent of a fissionable isotope, while Uranium 238 (which is not fissionable) has 99.3 percent. To enhance the U-235 content, it must be submitted to an enrichment process, through which the Uranium 235 is enriched to 3.2 percent, and the Uranium 238 content is lowered to 96.8 percent.

The "bottleneck" of any nuclear program is precisely the uranium enrichment: There are few known technologies and the few countries that have mastered them do not want to transfer them, which has led the Brazilian Government to include in the agreement with the FRG a clause by which a new enrichment process -- the "jet nozzle" -- would be developed jointly by the two countries. This process was created by scientist Erwin Becker, but its economic feasibility has not yet been proven. In addition, Campinas University is developing an enrichment process with laser rays.

How, then, can the uranium enriched for the production of electricity be used for the manufacture of bombs? It is directly possible by running the Uranium 238 several times through the enrichment process to achieve the level of 99.6 percent of Uranium 235, which is necessary for an atomic bomb. Richer agrees with this theory, but adds that this process would be very costly for the country, which "does not have the economic resources to face such a cost." "Moreover, Brazil would not have anywhere to drop a bomb," Richer added.

The possibility of Brazil manufacturing its first atomic bomb must take into account another aspect: the aircraft to carry it in case one day Brazil intends to detonate it. For this reason, there are those who see a connection between the signing of the nuclear agreement with the FRG and the simultaneous bolstering of the Brazilian aeronautics industry.

CSO: 5100/2176

BRAZIL

ARMY MINISTER STRESSES NEED TO COMPLETE NUCLEAR CYCLE

PY051730 Sao Paulo FOLHA DE SAO PAULO in Portuguese 4 Sep 85 p 4

[Text] Brasilia--during the installation of the Provisional Commission for Constitutional Studies yesterday, Army Minister General Leonidas Pires Goncalves, 64, said that "countries that do not complete the nuclear cycle in the 21st century will not be considered a [world] power." According to the minister, "to complete this cycle does not necessarily mean manufacturing bombs. It means mastering a technology for peaceful ends, for its use in agriculture, medicine, or in all sectors where it can be used."

According to the opinion of the generals consulted yesterday, Brazil is not thinking of manufacturing the atomic bomb, but it must not give up the right to develop uranium-enrichment technology. They consider the atomic bomb as a consequence, not a cause, and stressed that the armed forces cannot improvise, and must, therefore, be prepared for anything, namely for war.

According to some information provided by these officers, research in the nuclear field is being carried out jointly by the three branches of the armed forces. The work is being coordinated by the Navy Research Institute, because the priority objective in mastering the uranium-enrichment technology is to build a nuclear submarine. The objective, the military officers stated, is to build an atomic reactor to be used in the atomic submarine.

They reported that the Aerospace Technology Center [CTA], is developing a project through the FRG jet nozzle process, while the Navy Research Institute is working on the enrichment of uranium using laser rays. The idea is to put together the acquired technologies through the development of two projects, aided again by personnel of the Army Technological Center.

The military officers also explained that the interest in mastering that process does not mean an interest in building the bomb, and that a nuclear submarine running energy is defensive equipment. They added that the decision to manufacture the bomb does not depend on the armed forces but on Congress.

CSO: 5100/2172

BRAZIL

ANGRA-I EQUIPMENT TO BE REPLACED TO AVOID PROBLEMS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Jul 85 p 28

[Text] Rio--The Angra-I nuclear plant is going to have its condenser pipes replaced this year to prevent future problems, guaranteeing its operation under more reliable operational conditions. That information was given to O ESTADO yesterday by a high-level source from the Ministry of Mines and Energy.

Angra-I is also going to replace its fuel this year, according to the plan for that atomic unit. In a first stage, the enriched uranium will remain in a pool and will then be reprocessed and reused. Later, Brazil will have to find a place for its atomic waste.

The first nuclear unit for the generation of electric energy has already been in operation for more than 70 days without any problem after the defect caused by the lack of adequate planning by Westinghouse, which is responsible for execution of the project, was corrected.

Risks and Losses

According to Ministry of Mines and Energy advisers, the government's tendency is not to cancel the third atomic plant project, Angra-III: basically for one reason: cancellation of the project would be so expensive that it would represent more of a loss than a saving.

A large part of the equipment for Angra-III is already stored at the Nuclebras Heavy Equipment Corporation (NUCLEP) in the Rio municipality of Itaguaí and it would be difficult for Brazil to resell the material; among other reasons, because the countries interested in purchasing it prefer those of later technological generation. The Angra-III computer is ready in the Federal Republic of Germany and will have to come to Brazil unless the country pays for its storage, which would also be expensive. According to the project time table and the president of the Brazilian Electric Power Stations Corporation (ELETROBRAS), Mario Bhering, the Angra-III project could be ready in 1992 but it is unlikely that the plant would enter into operation that year.

The ground of the site intended for the construction of the third nuclear plant for the generation is ready for the project the timetable of which has been delayed.

On the other hand, Angra-II has two-thirds of its concrete ready and next year could begin the equipment installation phase. In the opinion of the Ministry of Mines and Energy experts, the nuclear problem has been the object of a political discussion. What should be done is to solve the nuclear program according to the national interests so that the country will not remain dependent on foreign technology.

One of the factors that some experts indicate in favor of the viability of the nuclear program is the fact that Brazil has one of the largest uranium reserves in the world.

8711

CSO: 5100/2157

BRAZIL

BRIEFS

EMFA OPPOSES CONSTITUTIONAL RESTRAINT--Brasilia--The Armed Forces General Staff [EMFA] is opposed to the inclusion of an article in the Constitution which would prevent the construction of a Brazilian atomic bomb, as proposed by Deputy Helio Duque--PMDB-PR [Brazilian Democratic Movement Party-Republican Party], 43 years of age, in a bill presented to the Chamber. Yesterday, Admiral Jose Maria do Amaral Oliveira, EMFA official, 59 years of age, said that he considers it "useless" to include such an article in the Constitution, for "we must not restrict ourselves for the future." According to Amaral Oliveira, Brazil has already taken its position with regard to the nuclear arms treaty and is sticking to that position: it is not signing the nuclear arms proliferation agreement because it considers that agreement restrictive. Meanwhile, he justified that position by saying, "I do not believe that there is any reason for us to build an atomic bomb" and then asking the question: "Who knows what our future will be?" Brig Gen Octavio Julio Moreira Lima, minister of aeronautics, 59 years of age, in turn, said that he sees no reason to change the Constitution at this time, "all the more so in the case of an important and controversial subject such as this which needs to be thoroughly discussed." He did not choose to give any further opinion on the construction of a Brazilian atomic bomb, saying that he needed to study the subject more thoroughly. [Text] [Sao Paulo FOLHA DE SAO PAULO in Portuguese 22 Jun 85 p 6] 8568

SBPC URGES ANTI-BOMB ACCORD--Belo Horizonte--A joint declaration by Brazil and Argentina in which the two countries renounce the construction of the atomic bomb, and the cancellation of agreements calling for the establishment of subsidiaries of NUCLEBRAS [Brazilian Nuclear Corporations, Inc] in association with KWU [Kraftwerk Union], German: these are the two principal motions approved at the conclusion of the roundtable discussion which, yesterday, examined the 10 years of nuclear accord at the 37th conference of the SBPC (Brazilian Society for the Advancement of Science). And the scientists even find the cancellation of those accords rather insignificant. They want the activities of the NUCLEBRAS subsidiaries to be reoriented. And on the research level--with the participation of society as a whole--and concentrated on the peaceful use of nuclear technology, they want the National Commission for Nuclear Energy to act jointly with the universities and research institutes. The scientists are also demanding meaningful participation in the commission as promised by President Sarney and announced by Mines and Energy Minister Aureliano Chaves one of whose responsibilities will be to re-evaluate the nuclear

program. Luiz Pinguelli Rosa, representative of the Brazilian Physics Association, suggested a meeting between presidents Sarney and Alfonsin, of Argentina, for the purpose of pledging to make Latin America a demilitarized zone and in the face of the nuclear powers take concrete steps in the reduction of the atomic arsenals. [Text] [Rio de Janeiro O GLOBO in Portuguese 16 Jul 85 p 7] 8568

CONSTRUCTION OF NUCLEAR PLANTS SUSPENDED—Under its program for reducing expenditures, the government has decided to indefinitely postpone the construction of several electrical power plants. [Text] [Sao Paulo Radio Bandeirantes Network in Portuguese 1000 GMT 7 Sep 85 PY]

NUCLEAR EVALUATION COMMISSION--In recent developments in nuclear policy, Jose Israel Vargas will head the new Brazilian nuclear evaluation commission. He was appointed to this post today by President Jose Sarney who also appointed the 15 other members of the commission. The government plans to reorient the national nuclear policy based on the suggestions made by the experts of this commission. [Text] [Brasilia Domestic Service in Portuguese 2200 GMT 3 Sep 85 PY]

CSO: 5100/2172

VENEZUELA

BRIEFS

CUBA A-BOMB 'PLANS'--Caracas, 29 Aug (EFE)--The anti-Castro group Independent and Democratic Cuba reported here today that Cuban President Fidel Castro has allegedly ordered the manufacture of atomic bombs on that Caribbean island. A note signed by anti-Castroite leader Huber Matos indicates that the Cuban Government is trying to obtain in the West the equipment necessary to process plutonium for the manufacture of atomic bombs. According to reports, the Soviet Union has insisted that the uranium used in the reactors be processed in its plants and has demanded that the plutonium remain there and not return to Cuba. The report states that the plan to manufacture nuclear weapons originated in a study that was prepared by the Cuban Government in 1968 to use nuclear energy to generate electricity on the Caribbean island. Independent and Democratic Cuba, whose headquarters is located in Miami (Florida, U.S.), selected Caracas as the site of its Sixth General Congress, which is scheduled to be held from 30 August to 1 September. The information released by the anti-Castroite group is based on a study by Raul Rodriguez del Rey, former official of the revolutionary government who was trained in the Soviet Union, but later sought asylum in an European country. [Text] [Madrid EFE in Spanish 0258 GMT 30 Aug 85 PA]

CSO: 5100/2174

REGIONAL AFFAIRS

OAPEC REPORT ON ARAB URANIUM RESERVES SUMMARIZED

Amman AL-DUSTUR in Arabic 17 Jul 85 p 7

[Article by Ahmad al-Hasban: "Report on Uranium for Use in Nuclear Generation of Electricity: 9,250 Tons of Proven Arab Uranium Reserves; Uranium Concentration of 180 Parts Per Million in Jordanian Phosphate"]

[Text] A report on uranium reserves in Arab states says that they have a total of 2,600 tons of proven reserves that can be extracted for less than \$80 per kilogram. All of it is located in the Popular Democratic Republic of Algeria.

The report, issued in the 11th annual report of the secretary general of OAPEC, added that there are about 6,650 tons in Somalia, but its extraction cost is between \$80 and \$130 per kilogram.

Additional sources have been discovered for which the feasibility of exploitation has not been determined. These include 5,000--50,000 tons in Algeria, 5,000 tons in Egypt, 3,400 tons in Somalia, 1,000--1,650 tons in the Sudan and 500 tons in Saudi Arabia.

The report explained that, excluding the socialist countries, world production of uranium for 1983 was approximately 39,000 tons, while world consumption for the same period was about 36,000 tons.

The report does not anticipate that consumption will increase beyond 65,000 tons by the year 2000, which means that proven reserves will be sufficient for the nations of the world, excluding the socialist countries, for approximately 40 years.

The report emphasized the need to assure uranium from within the Arab world itself for use in Arab nuclear reactors whose construction has been decided upon. In addition to the confirmed and additional reserves, discovery of other sources is expected in these countries or elsewhere. This will require concentration on exploration efforts and cooperation in mining, processing and enriching the uranium to make it suitable for use in reactors.

From another perspective, the report explained that Arab phosphates are considered an important source of uranium if extraction is feasible economically.

It confirmed that the proven phosphate reserves in the Arab world are about 60.7 billion tons, equal to about 47 percent of the world's reserves.

These reserves are located in Morocco, Tunisia, Jordan, Syria, Algeria, Egypt and Iraq. In addition, there are 1.6 billion tons of discovered reserves in Jordan, Egypt, Mauritania and Saudi Arabia.

It explained that the concentration of uranium in these phosphates varies, on the average, from 50-120 parts per million. The concentration is higher in some of the layers in Morocco, where it reaches 250 parts per million.

The report said that the theoretical reserves of uranium in the phosphate available in the Arab world is about 7 million tons. However, it is not possible to extract all of this because it is impossible to transform all of the phosphate into phosphoric acid by the wet process.

However, the possible amount from extraction as a secondary product in the installations that produce phosphoric acid from phosphates by this method currently working in the Arab world is about 1,483 tons per year, based on 1982 figures. Production of this amount requires detailed economic study before construction of the necessary equipment is pursued. It explained that projects are ready or under study in Morocco, Tunisia, Syria and Jordan to extract uranium from these installations. They can be implemented if their economic return increases.

From another perspective, the report explained that during 1983 proven uranium reserves in the world, excluding the socialist countries, amounted to about 2.064 billion tons. The price of extraction for 1.470 billion tons of this amount is less than \$80 per kilogram, while the price of extraction for the remaining 576 million tons varies between \$80 and \$130 per kilogram [figures as printed].

Seven states in the world represent the preeminent centers of uranium reserves with an extraction price of less than \$80 per kilogram. These are: Australia, with 314,000 tons of reserves; South Africa, with 191,000 tons; Canada, with 176,000 tons; Brazil, with 163,000 tons; Niger, with 160,000 tons; the United States, with 131,000 tons; and Namibia, with 119,000 tons.

12780

CSO: 5100/4504

BANGLADESH

AEC CHAIRMAN SPEAKS AT HIROSHIMA DAY SEMINAR

Dhaka THE NEW NATION in English 13 Aug 85 pp 1, 8

[Text]

The imperative need for evolving a foolproof safeguard system against any possible nuclear holocaust that could destroy the entire mankind was underlined at a seminar held in Dhaka yesterday in observance of the "Hiroshima Day", reports BSS.

Speakers at the seminar also called for peaceful application of nuclear technology that would bring about prosperity for the whole mankind through using radio-isotopes for constructive purposes.

The seminar on the theme "hazards of nuclear war and atom for peace", was organized under the joint auspices of Nuclear Society of Bangladesh and the Bangladesh Medical Association (BMA) at the Atomic Energy Commission auditorium in Dhaka yesterday.

Dr. Anwar Hossain, Chairman of the Atomic Energy Commission and President, Nuclear Society of Bangladesh, presided over the seminar and Dr. Abul Quasem, President of Bangladesh Medical Association presented a keynote paper.

Discussing on the subject, Dr. Hossain pointed out that there was already more than enough stockpile of nuclear warheads in the possession of super-powers to destroy the civilisation itself.

He suggested that an international inspection and safeguard system should be evolved to put a check on any future "diversion of nuclear power to use it for destructive purposes".

Dr. Anwar Hossain observed that an international non-proliferation treaty might not be sufficient to check a future holocaust and called for an adequate and foolproof international safeguard system that effectively works as a watchdog against any diversion of atomic energy from its peaceful utilisation.

Dr. Anwar Hossain also suggested that the developing countries should seek to maintain a balance of power among the superpowers, possessing nuclear warheads, until an international agreement could be reached against their destructive use.

He also suggested that the developing countries seeking technology transfer should forge a group among themselves to undertake a cooperative programme for peaceful application of nuclear power under the TCDC (Technical Cooperation among Developing Countries) concept.

Dr. Hossain said that developing countries needed transfer of nuclear technology to use it for peaceful purposes to accelerate their national development efforts.

Earlier, in his keynote paper, Dr. Abul Quasem, the BMA President highlighted the fatal consequences of an eventual nuclear war and the arms race and the global military expenditure and suggested international efforts for ensuring peaceful application of nuclear power for the well-being of mankind.

He pointed out that nuclear science at its present stage of development could play manifold beneficial roles in the fields of medicine, agriculture and energy.

The seminar was participated, among others, by Dr. M. A. Mannan, member of the Atomic Energy Commission, Dr. Kamaluddin Ahmed, Director of the Institute of Nuclear Medicine and Dr. Sarwar Ali, Secretary General of the BMA.

Speakers at the seminar dwelt on different technical aspects of how nuclear energy could be used in various fields of agriculture, food production, power generation and medicine.

INDIA

OFFICIAL ALLEGES URANIUM THEFT BY FOREIGN NATIONALS

Madras THE HINDU in English 17 Jul 85 p 9

[Text]

LUCKNOW, July 16.

An allegation about theft of uranium from a mine in U.P. by two foreign nationals was made in the State Assembly today by a Janata member. He alleged that some officials of the Geology and Mining Department had connived in the theft.

The issue was raised through an adjournment motion by Mr. Harshvardhan Singh, who said a Canadian firm had shown interest in preparing a project report for exploration of uranium in a mineral belt in Lalitpur district near the MP border. This request, was, however, turned down and Indian geologists prepared the project report. Uranium was traced under 10-metre thick layers of rock phosphate in the area. Preliminary mining has since been started under the supervision of the GSI and the Atomic Energy Commission, the member said.

One of Indian origin: Two Canadian nationals, one of them of Indian origin, had stayed in the site camp unauthorisedly in May this year. They also visited the drilling site in Sorson, a prohibited area, and ultimately decamped with 500 gm sample of uranium kept under the supervision of the Directorate-General of Mining. Some of the project officials had intimated the Lalitpur district officials about the presence of the Canadian nationals in the sensitive spot. But no action was taken.

Mr. Harshvardhan Singh alleged complicity of some senior officials of the Mining and Geology Department and demanded action against them. He and later other members of the Janata Party, drew the Government's attention to the poor security and demanded the resignation of the Industries Minister, Mr. Gopinath Dixit, who also holds the Mining and Geology portfolio. Mr. Dixit was present in the House, but did not make any comment on the allegation.

The Speaker, Mr. Niaz Hussain, disallowed the adjournment motion. He, however, directed the Government to take note of the disclosures made by the Janata member.

CSO: 5150/0041

INDIA

LEAKS OF CLASSIFIED DATA ON URANIUM REPORTED

Calcutta THE TELEGRAPH in English 23 Jul 85 p 4

[Article by Sumir Lal]

[Text]

Lucknow, July 22: The reported leakage of classified information on the location and content of uranium deposits in Uttar Pradesh and the smuggling of uranium ore could become a major issue in the monsoon session of Parliament beginning tomorrow.

The controversy revolves around two Canadian experts who camped at Sonrai in Lalitpur district for five days in May to survey a rock phosphate project. They allegedly returned to Canada with 500 kg of cafenite, a rich uranium ore, which was found at a depth of 10 metres under the rock phosphate deposits. They are said to have had access to all restricted areas and reportedly stayed at the camp of the director of the Uttar Pradesh State Mineral Development Corporation.

A mining engineer, Mr K.N. Pande, was the first to inform the authorities. He was promptly transferred to a silica project at Sankargash near Allahabad.

According to Mr Harsh Vardhan, the Janata MLA who first raised the issue, the Canadians, Mr Chester Chinek and Mr S. Srinivasan, belonged to the mining and excavation firm Metchem, whose Indian agent is the New Delhi-based Vaishali Enterprises. Based on information gathered from various sources, Mr Vardhan has raised the following questions:

- Why were the Canadians so interested in the area that they were willing to prepare the rock phosphate project report

at their own cost?

- Was the atomic minerals department aware of the presence of the exceptionally high-grade uranium deposits?
- Why were district officials not informed of the foreigners' presence?
- Why was no action taken when the local intelligence unit did learn of them and reported it to the DIG, CID?
- Why did the Canadians give vague, incomplete address when they registered at Hotel Clarks Avadh in Lucknow?

The issue had rocked the Uttar Pradesh Assembly last week with the Opposition initially demanding the resignation of the industries minister, Mr Gopinath Dixit, and later of the chief minister, Mr N.D. Tewari.

A delegation of the state unit of the Janata Party left for New Delhi last night to collect more information and also to brief senior MPs. The leader of the Janata Party in Parliament, Prof. Madhu Dandavate, will, in all likelihood, be asked to raise the issue.

When the issue was raised in the Assembly, the Opposition had demanded the resignation of the state industries minister for dereliction of duty. Later, as Mr Vardhan gathered more information, a Janata delegation submitted a memorandum to the governor asking him to dismiss the N.D. Tewari ministry. Neither Mr Dixit nor Mr Tewari were available for comment over the past two days but, significantly, the treasury benches had remained quiet throughout the furore in the Assembly.

INDIA

ANALYST STRESSES NEED FOR FIRM NUCLEAR POLICY

Madras THE HINDU in English 11 Aug 85 p 2

[Article by G. K. Reddy]

[Text]

A GOVERNMENT cannot afford to be coy and non-committal, or defensive and diffident, over issues of momentous importance. The nuclear issue is one on which India has been blowing hot and cold, revelling in ambiguity, double-talk and even self-deception.

The Prime Minister, Mr. Rajiv Gandhi, does not let go a single opportunity to talk of Pakistan's nuclear ambitions. But he has been deliberately leaving the Indian response open to belighful confusion and possible misrepresentation. He has been treating this as a talking point, not a serious policy matter calling for a wider public debate on what India could do, or should do, in these circumstances.

This is too grave an issue to be left to politicians and bureaucrats who remain hemstrung by other compulsions. Though Mr. Rajiv Gandhi has been cautioning the country against the dangers of a nuclear threat from Pakistan, there are no signs of any internal deliberation within the Government on how India should cope with it. Nor have the people been told that if India is compelled to do so it would not hesitate to exercise the nuclear option.

In their excessive preoccupation with the threat of a conventional war by Pakistan, the Chiefs of Staff too have not been engaging in an in-depth strategic study of how India should deal with its expected acquisition of nuclear capacity in the not-too-distant future. The defence establishment has been treating this as a matter of political and not military decision, while the atomic scientists have been awaiting a clear-cut directive from the top to step up their research and development to enable the country to exercise the option at the right moment, if it is left with no other choice.

The Prime Minister alone can set the tone for a national debate on the pros and cons of such a fateful decision. But unfortunately, in the absence of an unequivocal and outspoken lead from him, some of his own colleagues have been trying to softpedal what he has been saying in the belief that he might have been misreported in the press by missing the nuances and shades of his observations. The re-

sult is that nobody knows what the Government would do in the event of a successful nuclear test by Pakistan, although the general expectation is that it will be forced to go in for the bomb under pressure of public opinion.

But an agonising dilemma at present is what India should do if Pakistan does not actually carry out a test explosion of a nuclear device, but makes the bomb as Israel has done with the full knowledge that it would certainly work when put to use. The critical component of a nuclear bomb, according to experts, is the trigger mechanism that causes the implosion and explosion, not so much the uranium or plutonium once it has been refined to the requisite weapons grade. It was in this context that Mr. Rajiv Gandhi pointed out recently that Pakistan has been experimenting with the krytrons stealthily obtained from the U.S. for producing the initial explosion that could trigger a nuclear blast.

At the diplomatic level, there is no way of dealing with such a situation since atomic technology has now reached a stage of great

sophistication at which preliminary test explosions have become superfluous, thus enabling a country like Pakistan to acquire nuclear capability clandestinely without detection if it is bent on achieving it at any cost. It is not enough for India to comfort itself with the thought that, since it is far ahead of Pakistan in nuclear development, it could exercise the option any time and establish a clear lead over Islamabad even if the Pakistani scientists succeed in making the bomb first.

A deterrent

India's nuclear policy should aim at preventing Pakistan from acquiring weapon capability if that is at all possible, or else exercising the option in good time leaving Pakistan in no doubt whatsoever about the consequences of its action. The real purpose of India going in for the bomb is not to use it as a weapon of war but only as a deterrent against any nuclear adventurism by a country like Pakistan. The decision to exercise the option, if and when it is taken, has to be matched by a series of

follow up political steps to contain the threat of a nuclear war with Pakistan.

It has been suggested by some arm-chair strategists that in exercising the nuclear option, India should embark simultaneously on confidence-building diplomacy to reduce the risk of a nuclear war with Pakistan. One does not have to wait for Islamabad to make the bomb with or without a test explosion to negotiate an agreement not to attack each other's nuclear establishments, not to be the first to use the bomb in any circumstances. If this limited understanding could be reached, either independently or as part of a comprehensive treaty of friendship or even a simple no-war pact, it should be possible to restrict the Indo-Pak nuclear race to manageable dimensions.

But such an accord cannot be achieved if only one side has the bomb and the other one continues to abjure it for whatever reason. One can talk of a nuclear truce if both have the bomb or neither has it, not in a completely one-sided situation. Those who have been urging Mr. Rajiv Gandhi to come forward with a definitive statement in Parliament, spelling out the country's nuclear policy in no uncertain terms, are not warmongers itching for a confrontation with Pakistan, but hard-headed realists, who feel that there is need for greater clarity and consistency in the articulation of the country's options.

The big mistake

The big mistake that India made in 1974 was to go in for the Pokhran test, treating it more as a status symbol, without preparing in advance to face the political fall-out with single-minded determination. The late Prime Minister, Indira Gandhi, should have pursued this step to its logical conclusion by conducting further

tests to get accepted as a nuclear power, freed from the many discriminatory restrictions which the big powers were trying to impose on India's nuclear development in the name of non-proliferation. She was prevailed upon by her advisers to abandon the idea of further tests and lurch back to the pre-1974 position with the warning that the U.S. might suspend PL-480 foodgrain shipments at a time when India was living from ship-to-mouth before the green revolution.

In the process, India failed to get accepted as a full-fledged nuclear power and subjected itself to increasing pressures to submit its entire nuclear programme to fullscope safeguards to prove that it had no intention of making nuclear weapons. It encouraged the pro-Pakistan elements in the West to turn a blind eye at Islamabad's bid to build the bomb by hook or crook with stolen technology and stealthily acquired equipment. The Chinese also helped Pakistan in mastering the nuclear complexities presumably sharing the western belief that a Pak bomb would be an effective counter-poise against India's nuclear ambitions.

The Prime Minister and his colleagues who have been speaking in different voices on different occasions do not seem to realise the gravity of the emerging nuclear threat from Pakistan. The big powers which continue to give

the benefit of doubt to Pakistan have been proceeding on the assumption, despite India's protestations, that the country was engaged secretly in not only perfecting its nuclear technology for exercising the option at short notice but also developing the delivery systems by concentrating heavily on its space programmes.

The so-called western concern at Pakistan's

nuclear efforts is only an eye-wash for the grave misgivings they continue to entertain about India's own nuclear intentions. The result is that India has seen the worst of both the situations further confounded by its own ambivalence. The very fact that the new 100 MW experimental reactor Dhruva that India has built at Trombay without outside assistance has become critical is being viewed by the west as further evidence of its rapid strides in nuclear development which could be used for military purposes.

There is need for greater imagination in the articulation of India's nuclear policies to impress all concerned that, while reserving the right to exercise the option should the need arise for it, the country remains fully committed to peaceful uses of this knowledge. Apart from campaigning for nuclear disarmament, India could come forward with suitable initiatives for persuading nuclear aspirants like Pakistan to agree to some credible limitations on uses of atomic weaponry in their own interests.

If it is not possible to prevent Pakistan altogether from making the bomb, the ruling military dictatorship in Islamabad can be made to realise that it would be to Pakistan's own advantage to agree to some credible constraint as part of the proposed friendship treaty or no-war pact.

At one stage the Indian intelligentsia used to sneer at Pakistan's nuclear efforts saying that it would probably qualify for the Nobel prize for peace by making an atom bomb that would not go off, because of the country's limited skills and resources. And now the tendency is to swing to the other extreme by imagining that Pakistan has the bomb already even before it has succeeded in making it.

The nuclear threat from Pakistan is going to be the biggest challenge to Indian diplomacy during this decade. It cannot be met by merely crying wolf or threatening to exercise India's nuclear option. It has to be faced with quiet confidence backed by a credible no-nonsense policy of wielding both the stick and the carrot, leaving Islamabad in no doubt that the real choice rests with it in choosing between a nuclear truce and nuclear confrontation.

And in pursuing this two-pronged policy India has to realise that the stage of restraining Pakistan from making the bomb has passed and what can be done now is only to contain the danger with a combination of firmness and flexibility in coping with it. The Prime Minister can no longer afford to interpret the country's nuclear policies with off-the-cuff remarks talking of the threat in a casual manner without matching action on the part of the Government. He needs the advice of experts who have spent years studying the complexities of the problem, not just bureaucrats who are content with thundering declarations reaffirming India's peaceful intentions.

INDIA

BJP EXECUTIVE RESOLUTION PLEADS FOR N-BOMB

Bombay THE TIMES OF INDIA in English 22 Jul 85 p 9

[Text]

BHOPAL, July 21: The national executive of the BJP today adopted a resolution calling upon the government to take "immediate steps" to develop nuclear bombs.

The immediate provocation for such a resolution was the recent statements made by the Prime Minister, Mr. Rajiv Gandhi, in connection with Pakistan's nuclear programme and his failure to indicate the manner in which the country should proceed to counter this threat.

The BJP, on its part, felt it necessary to declare that it "cannot even conceive the idea of countering Pakistan's threat by willy-nilly pushing India into the umbrella of any super power." The resolution stated that diplomatic initiatives taken by the government to deter Pakistan from going in for a nuclear bomb "appear to have completely failed."

The only alternative, as perceived by the BJP, was developing "our own nuclear bomb." The resolution said the party was convinced that the country could not afford to adopt a "policy of drift and escapism" any longer in a serious matter involving the country's unity, integrity and security.

Notably, the resolution on nuclear bomb could be considered the most forthright of the resolutions adopted during the three-day meeting of the party's national executive. The BJP's categorical stance in respect of the bomb issue, in contrast to the cautious ambiguity in the resolution on the reservations policy or the lack of thrust in the resolution on economic situation, was indicative of the party's anxiety to take initiative in its bid to be back in the political reckoning and become "an instrument of change."

As the report of a party working group put it in the context of the BJP's performance and prospects, "the party must catch up with the times and play its historic role for providing a credible national alternative."

INDIA

BJP PRESIDENT BACKS NUCLEAR-BOMB OPTION

Calcutta THE TELEGRAPH in English 23 Jul 85 p 4

[Text]

Bhopal, July 22: The BJP president, Mr Atal Behari Vajpayee, today defended the party's call for a nuclear bomb, asserting that "there is no other alternative." He called upon the Prime Minister to evolve a national consensus on the issue as "there is nothing more unfortunate than the poor and underdeveloped countries joining the nuclear arms race."

He said the government had failed to stop Pakistan from going ahead with its nuclear plans diplomatically. Besides China already had the bomb. "If the Prime Minister has an alternative, he should take the nation into confidence. He should not scare the nation by his repeated warnings that Pakistan was very close to making the bomb, the BJP president said.

According to him, the Prime Minister's statements were only "demoralising the nation and confusing the world. Mr Rajiv Gandhi, he said, "should stop playing politics with the security of the country."

Asked if such a step would not bring the nuclear arms race to the doorsteps of the nation, Mr Vajpayee countered: "We tried to make a nuclear-free world but failed. We could not make a nuclear-free Asia or even South Asia. It is already at our doorsteps."

Mr Vajpayee, who was speak-

ing at the conclusion of the three-day meet of the BJP national executive, clarified that the changeover of the party's philosophy from Gandhian socialism to integral humanism was only "a change in terminology and not in content." Asked whether there was no conflict between Gandhian philosophy and advocating a nuclear bomb, the BJP president parried: "There is no connection between Gandhian socialism and the bomb. It does not change our Gandhian approach to socio-economic problems."

Gujarat

On Gujarat, Mr Vajpayee refused to take a clear stand on whether the BJP supported the prevailing reservation, restricting his reply to "the government must decide this issue by national consensus." He said his party definitely stood for reservation and further quotas on the basis of economic status, but he would not clarify whether he felt that the percentage of quotas reserved by the Congress(I) was reasonable.

On Punjab, he felt any talk between the Centre and the Akalis should be "unconditional." Any preconditions attached by either side would be detrimental to arriving at a settlement, he said.

Merapani

Referring to the inter-state border war at Merapani, the BJP resolution called for a dismissal of both the Assam and Nagaland governments for this "gross violation of the Constitution."

INDIA

REPORTS, COMMENT ON PAKISTAN NUCLEAR DEVELOPMENT

New Delhi 'Observers'

Bombay THE TIMES OF INDIA in English 14 Jul 85 p 9

[Text] WITH the reported testing of a triggering device, Pakistan may now be confident of exploding a nuclear bomb in the near future, observers here believe.

Besides the triggering mechanism, the main ingredient of a nuclear device is uranium-235 that is produced by the enrichment of natural uranium.

Since 1978, Pakistan had been reportedly working on a secret centrifuge plant at Kahuta near Islamabad for uranium enrichment.

The design was based on the system developed by the European consortium, Urenco, and Pakistan had imported the special steel for making centrifuges from a Dutch firm between 1978 and 1979.

It is not known for how long the plant has been working but experts say that five kg. of U-235 is enough for a bomb.

Observers point out that the testing of trigger devices would suggest that Pakistan is already in possession of U-235 and that assembly of a nuclear device is imminent.

A nuclear device usually has a spherical core of U-235 surrounded by high explosive charges. The charges are set off by the triggering mechanism and the resulting chemical explosion compresses the uranium core to make it super-critical when nuclear explosion occurs.

The electronically-controlled triggering mechanism is said to be a vital part of the system as the chemical charges must be set off precisely at the same time and within a duration of a thousandth of a second to uniformly compress the uranium core at a tremendous speed.

The tests reportedly carried out by Pakistan were non-nuclear meaning that the trigger mechanisms alone were tested without the uranium core.

Pakistan is said to have obtained the triggering device called Krypton from the United States. The device is said to have other industrial uses, a reason why it was allowed to be exported.

The trigger for the Indian nuclear device exploded in 1974 was made indigenously by a team of electronic engineers at the Bhabha Atomic Research Centre (BARC) and scientists at a defence institute in Chandigarh.

BARC sources said that all subsystems of the Indian nuclear device including the trigger were tested individually before the Pokharan test—a precaution to ensure that the bomb does not end up as a "dud."

Other than U-235, the fuel for a nuclear bomb is plutonium which is obtained by chemically processing the spent fuel of a nuclear reactor.

Observers say the Pakistani nuclear device, if built, will be based on U-235 as the country is not known to have an operating fuel processing plant to manufacture plutonium.

Editorial: 'Looming Nuclear Threat'

New Delhi PATRIOT in English 15 Jul 85 p 4

[Editorial]

[Text]

Concern repeatedly voiced in recent days by India on a specific issue with grave implications for peace in the region has received loud and clear confirmation from the reportedly successful testing of US-made triggers for nuclear bombs. Prime Minister Rajiv Gandhi gave high priority, during his recent mission to four nations, to the subject of the threat posed by Pakistan's nuclear plans. He sought to stress the Indian apprehension that the country, languishing under the Zia military dictatorship in several other respects, had come close to making the bomb. He forcefully highlighted the fact that the US could have done much to curb this threat, but had not. After his meeting with President Ronald Reagan, much publicity was given to a Washington assurance to Mr Gandhi and India in this regard. The non-nuclear explosion now reported from a "super secret" plant near Islamabad shows up the worth of such assurances. Pakistan's success in procuring the triggers, produced only by one US firm, on whose supply Washington officially exercises absolute control, may very probably testify to more than the skills of its spies and smugglers.

The disclosure is the more meaningful for having immediately followed the report about the US rushing air-to-air and surface-to-air missiles worth \$ 8.3 million to Pakistan. And the meaning is the more menacing for the

fact that all this is in addition to the military aid of nearly \$ 5 billion since the infamous five-year US-Pakistan agreement of 1981, an aid package which includes 40 F-16 fighter-bombers capable of carrying nuclear weapons. The rather obvious truth is that all the bonanza showered on the Zia regime has been inspired by the US geopolitical strategy under Reaganism that seeks to build and beef up Pakistan as a "frontline State" to guard neo-imperialist interests in the entire region, in the context of which such matters as nuclear non-proliferation are irrelevant. None but the hopelessly naive ever believed that a Sino-US nuclear deal has been stalled by evidence of China's help to Pakistan in acquiring nuclear weapon capability, and that considerations like the need to twist Beijing's arm over Taiwan did not weigh more heavily with Washington. None but those totally ignorant of both geography and recent history would believe either that the US military aid to Islamabad was directed merely or even mainly against Afghanistan, though the latter's independence and sovereignty too are a target of the Zia-Reagan cooperation. The growing US-Sino-Pak axis, as has been noted before, poses a threat to India and the region. The explosion, which it has not been possible to muffle, only illustrates the proportions and proximity of the danger.

The warning to India is clear. It is one against the unwisdom of entertaining illusions about the nuclear ambitions and potential of those who make unnatural common cause with neo-imperialism and who cannot be turned into good neighbours by a "normalisation" process through such means as trade agreements and cultural exchanges. It is also one against letting oneself be lulled into any degree of complacency by guarantees of their good conduct from their patrons who see their interests as running counter to peace anywhere.

INDIA

PAKISTAN AMBASSADOR DENIES NUCLEAR ARMS PLAN

Bombay THE TIMES OF INDIA in English 17 Jul 85 p 5

[Text]

BOMBAY, July 16.

PAKISTAN'S ambassador to India, Dr. Humayun Khan, today claimed that Pakistan neither had a nuclear weapons programme nor did it have any intention of going in for it.

Addressing members of the Rotary Club of Bombay here, he said that his country's nuclear programme was a Pakistan, Dr. Khan said his country was only "modernising" its defence forces and replacing equipment that had become "obsolete many years ago".

On the charge of Pakistan's interference in India's internal affairs, he said "Pakistan had nothing to gain by creating instability in our eastern neighbours".

Dr. Khan said he believed that India and Pakistan were on the threshold of a new chapter in bilateral relations. The recent Indo-Pak joint commission meeting had marked the restoration of a formal dialogue between the two countries, he said, and added that both the countries had agreed to co-operate in various fields like health, information, culture, agriculture, and economic planning.

The ambassador who is on his first visit to Bombay, said that the city symbolised a vibrant nation that was marching toward a better future. The president of Rotary Club of Bombay, Mr. M. K. Sanghi, welcomed the guests.

CSO: 5150/0040

INDIA

MINISTER TELLS INDIAN POSITION ON PAKISTANI BOMB

Discussion in Upper House

Bombay THE TIMES OF INDIA in English 8 Aug 85 p 1

[Text] New Delhi, August 7--The government today assured the Rajya Sabha that the country was "fully capable" of meeting Pakistan's nuclear challenge.

While reiterating the official policy of using atomic energy only for peaceful purposes, the minister of state for external affairs, Mr. Khursheed Alam Khan, said: "We have kept our options open". India had not signed the nuclear non-proliferation treaty.

Replying to the debate on the calling-attention motion tabled by Mr. J. K. Jain (Cong.) and others, Mr. Khan warned that if Pakistan went nuclear, India would not remain a silent spectator. "We will reply the stone by stone", he added and hoped that Pakistan would not do anything that would result in a qualitative change in the security environment in this region.

Policy Review

Almost all the opposition parties, barring the CPM, suggested that India should develop nuclear weapons to counter Pakistan's threat. Some members from the ruling benches also supported the plea for a review of the nuclear policy in the wake of reports indicating Pakistan's growing nuclear capabilities. Most speakers assailed the countries, especially the U.S., which were directly or indirectly helping Pakistan in its "nefarious" designs.

Sharing the concern expressed in the house, Mr. Khan pointed out that the available evidence and public statements by Pakistani scientists suggested that the country had been pursuing the objective of acquiring the wherewithal to manufacture nuclear weapons.

He said India had the capacity and capability to produce atomic weapons but it did not believe in flaunting its technical know-how as the neighboring country was doing. If Pakistan believed that India had

lagged behind in nuclear technology, it had every right "to remain under this illusion" India demonstrated its capability in 1974, he said in an apparent reference to the Pokhran implosion.

U.S. Assurance

Referring to the U.S. arms and nuclear aid to Pakistan, Mr. Khan said this aspect was discussed with the U.S. President by the Prime Minister, Mr. Rajiv Gandhi, during his recent visit to that country. Mr. Reagan has assured that the U.S. would make efforts to dissuade Pakistan from developing the atom bomb.

"But I cannot say anything about how serious they are about it," he added. India firmly believed that Pakistan did not need such massive arms build-up.

Regarding Chinese involvement in Pakistan's nuclear programme, Mr. Khan said the latest information available to him indicated that China was interested neither in proliferating nuclear weapons on its own, nor in helping others to do so. China had also denied passing on vital nuclear information to Pakistan, he said.

Mr. Khan said India was keen to improve relations with Pakistan. But nobody could "predict the course of the future in view of the changing circumstances." He, however, turned down the suggestion for any pre-emptive action to counter the Pakistan's threat. He also ruled out the possibility of seeking protection under the nuclear umbrella of any superpower.

The minister of state for external affairs, Mr. Khursheed Alam Khan, in his statement assured the house that the government was keeping a constant vigil on all developments having a bearing on India's security. He, however, made it clear that India remained committed to developing nuclear technology for peaceful purposes.

Before the discussion on the motion started, the BJP member, Mr. L. K. Advani, observed that the subject should have been dealt with by the defence minister and not by the minister of state for external affairs.

The chairman, Mr. R. Venkatraman, however, said it was for the government to decide who should deal with the matter. Initiating the discussion, Mr. Jain said it was a matter of great concern that Pakistan was fast moving towards developing a nuclear weapon.

He said Pakistan's intentions were not clear since they say something and do something else.

Lok Sabha Discussion

Bombay THE TIMES OF INDIA in English 9 Aug 85 p 9

[Text] New Delhi, August 8(PTI)--India will not go in for a nuclear umbrella as an option to ward off the nuclear threat from Pakistan as it was confident of protecting itself, the minister of state for external affairs, Mr. Khursheed Alam Khan, told the Lok Sabha today.

The minister, who was replying to a calling attention notice on Pakistan's attempt to develop a nuclear bomb, said if that country thought that it was ahead of India in the nuclear field, "Let it remain in that illusion." They would come to their senses when the opportunity arose, he asserted.

Mr. Khan said there had been clear indications that Pakistan's nuclear programme was not peaceful. There was a wide gap between what Pakistan says and does about producing a bomb.

About reports that the former U.S. President, Mr. Richard Nixon, had said that in the 1971 Bangladesh war he had option to use nuclear weapon, the minister said, "it is for Mr. Nixon to say if he wanted to use nuclear weapon or not."

Mr. Bhattam (Telugu Desam), who had tabled the motion, expressed concern at Pakistan's nuclear programme and suggested that government should consult opposition leaders and evolve a national consensus on the country's nuclear's options.

"India's ethical stand that we will not have a bomb is not enough," he said.

He suggested that one of the options was to have a nuclear umbrella.

U.S. Help

Mr. Khan said reports about the clandestine procurement of nuclear equipment and components by Pakistan have reinforced India's apprehensions about the Pakistani bomb.

Of immediate relevance was the case of a Pakistani national, who was caught smuggling Krypton from the U.S. to Pakistan, and the recent report by the ABC correspondent, Mr. John Scali, that Pakistan had carried out a nonnuclear explosion using Kryptons of U.S. origin.

While the U.S. state department has been unforthcoming on the revelations made by Mr. Scali, "we hope that the United States, as a result of Mr. Rajiv Gandhi's discussions with President Reagan, will exercise its influence to dissuade Pakistan from pursuing the course," he added.

Prof. P. J. Kurian (Cong.) said the fact that Pakistan was able to smuggle out equipment from the U.S. suggested connivance.

India, he said, could not depend upon Pakistan even if the two countries entered into a nuclear-freeze agreement. He pleaded that India too should have the bomb as it would have the deterrent effect.

The minister said whatever Pakistan might say or do could not influence India's decision. "We know what we have to do and Pakistan won't be able to influence us," he said.

UNI adds: Pakistan's proposals for a nuclear-free zone in south Asia had "no meaning" when China, a neighbour, was a nuclear power, Mr. Khan pointed out.

He said the government had "very definite views" on its options in the face of "the Pakistani threat to go nuclear." Any such proposal could be discussed only after consultations with neighbouring countries and with due consideration to other factors like the possession of nuclear weapons by Israel.

CSO: 5150/0055

INDIA

PAPERS REPORT DETAILS ON NEW REACTOR, POWER PLANT

Dhruva Goes Critical

Bombay THE TIMES OF INDIA in English 9 Aug 85 p 1

[Text] Bombay, 8 Aug--The country's fifth nuclear research reactor, Dhruva, attained criticality at 2.42 a.m. today, an official of the Department of Atomic Energy said.

Situated at the Bhabha Atomic Research Centre in Trombay, the 100 MW heavy water moderated reactor is completely designed and built in India. Dhruva, one of the high neutron flux reactors in the world, will enable production of certain radioisotopes which would not be possible in low flux reactors.

The attainment of "criticality" signifies the successful sustenance of the nuclear chain reaction.

Dhruva uses natural uranium as fuel and heavy water as moderator and coolant. High power operation of the reactor is expected to be achieved later this year, a spokesman said.

Plutonium Production

PTI adds: With Dhruva becoming critical, the country will now have a major facility for producing plutonium, the fuel for the second generation of fast breeder reactors--the first one of which is nearing commissioning at Kalpakkam, near Madras.

The plutonium produced in Dhruva would not be subject to safeguard regulations of the International Atomic Energy Agency (IAEA) as the reactor is built indigenously.

Dhruva will be operated at low power for some days to evaluate the performance of various systems before gradually raising it to the maximum 100 MW.

The fuel for the reactor was fabricated at the nuclear fuel complex in Hyderabad. The 100 tonnes of heavy water was produced indigenously at Nangal, Baroda and Tuticorin heavy water plants.

Radioisotopes

In Bombay, the BARC director, Dr Iyengar, said the reactor would help increase production of isotopes like iodine-131, chromium-51, and molybdenum-99, demand for which has been rising in India, and also iodine-125, currently imported.

The reactor has also special facilities for testing reactor materials and fuels for the power programme, he said.

The announcement on Dhruva becoming critical was made simultaneously in Bombay by Dr P. K. Iyengar and by Dr Ramanna in Delhi.

The biggest among Indian research reactors, Dhruva joins five others, the last of which (Purnima II), based on man-made uranium-233 fuel, was commissioned only last year.

The one-megawatt swimming pool reactor Apsara, using British-supplied enriched uranium fuel has been in operation since 1956.

Cirus was built with Canadian help in 1963. The other two reactors--Zerlina and Purnima-I were designed and built by BARC.

Mapp in Line

Talking to newsmen, Dr Ramanna also announced that the second unit of the Madras Atomic Power Project (MAPP) at Kalpakkam will become critical by next week and power will flow in the grid by the end of this year.

He said the fast breeder test reactor, based on French design and using Indian-made fuel also at Kalpakkam, will become critical next month.

Dr Ramanna said Dhruva would become operational by November. It would replace the 25-year-old Cirus reactor, he added.

The Maharashtra Atomic Power Project-2 (MAPP-2) would go critical by the middle of this month and be operational by October.

He said MAPP-2, with a capacity to generate 220 MW, was identical to MAPP-1 barring some changes in design.

While the fuel for Dhruva came from the nuclear fuel complex in Baroda and Hyderabad, major components like the reactor vessel, and fueling machine were supplied by Larsen and Toubro, Walchand Industries and the Bharat Heavy Electricals Limited, Dr Ramanna said.

Congratulating Dr Iyengar and Mr Sundaram, the AEC chairman said that unit one of the Rajasthan atomic plant, that has been shut down for repairs, will start functioning by the end of next month.

He said cracks continued to appear at the end shield even after they were repaired.

The Dhruva project, begun on 30 October 1975, was coordinated by Mr S.M. Sundaram, director, research operations and maintenance group, BARC. Control systems in the reactor were installed by the electronics and instrumentation group led by Dr P. R. Dastidar and Mr S. N. Seshadri.

PM's Felicitations: The Prime Minister, Mr Rajiv Gandhi, congratulated BARC scientists for the successful commissioning of Dhruva.

In a one-line message to the director of BARC, Dr P. K. Iyengar, Mr Gandhi said, "congratulations for the successful commissioning of Dhruva."

Dr Raja Ramanna, in his message, said the scientists had achieved "a major landmark in the country's atomic energy programme."

Heavy Water Leak Confirmed

Bombay THE TIMES OF INDIA in English 10 Aug 85 p 1

[Text] Bombay, 9 Aug--Four tonnes of heavy water at the Dhruva reactor overflowed out of the reactor core on Tuesday two days before it reached criticality, sources at the BARC confirmed today.

They said technicians at the reactor failed to close a valve, through which heavy water was being pumped into the reactor, while inserting fuel rods into the reactor's core. The heavy water, valued at Rs. 2.4 crores, split out of the core into a "sump" situated at a lower level in the reactor.

The heavy water got contaminated with moisture in the reactor's atmosphere, thus reducing it below the stipulated 99.98 percent purity. The sources, however, said all the split heavy water was recovered, and is now undergoing an upgradation process to restore its purity.

An upgradation facility was available at the BARC, similar to the one at the heavy water plant situated at Kota, Rajasthan, though, on a much smaller scale, the sources said. The spillage of heavy water did not pose any health hazard as the reactor had not yet begun operations.

A spokesman of the BARC said, the overflow was not an accident, but a pre-criticality operational hazard. He said, most nuclear reactors in the country had facilities to recover split heavy water, a very expensive product essential to the atomic energy programme and upgrade it at their own complexes.

Meanwhile, the second 235 MW Madras Atomic Power Station (MAPP-II) will attain criticality on Monday, scientists associated with the Department of Atomic Energy said.

The MAPP-II reactor uses natural uranium, obtained from the Nuclear Fuel Complex, Hyderabad, and heavy water as moderator and coolant. Power from this reactor is expected to flow into the Tamil Nadu grid later this year.

The reactor facility will not come under the purview of international safeguards as the reactor has been built with indigenous technology, a spokesman said.

A spokesman of the BARC clarified today that the natural uranium, now being used in Dhruva, was obtained from the atomic fuels division of the BARC, and not at the Nuclear Fuel Complex, Hyderabad.

Not for Plutonium

Calcutta THE SUNDAY STATESMAN in English 11 Aug 85 p 7

[Text] From Our Special Representative

BOMBAY, Aug. 10.—The significance of "Dhruva", one of the largest and the most sophisticated nuclear research reactors in the world, is that it will give a great boost to India's nuclear research programme, particularly in the field of fundamental research in structural physics and the structure of biological molecules.

Besides, Dhruva, which went critical two days ago, will also produce a variety of isotopes which will enable Indian scientists to undertake basic research in applying these isotopes for agricultural, medical and industrial use.

A highly-placed source at the Bhabha Atomic Research Centre, which has designed, manufactured and constructed this complicated reactor, ridiculed reports in a section of the Press saying that Dhruva would be a great help in producing plutonium for building a nuclear bomb.

"We do not need to construct such a sophisticated reactor for producing nuclear bomb-grade plutonium", said this scientist. India has enough plutonium of that grade without Dhruva, he said.

As for the report that Dhruva can produce 300 kg of plutonium a year at its full capacity, the source said this was not correct. Anybody having a basic knowledge of science would know that a nuclear reactor with a 100-MW capacity can produce hardly 30 kg of plutonium, he pointed out. Even the Tarapur atomic power plants, together with 600-MW capacity, produce 80 kg to 90 kg of plutonium every year. The speculation that Dhruva can produce 150 kg to 300 kg of material every year is far from correct, he asserted.

Any plutonium thus produced, can be used for various purposes, including for nuclear explosions. Thus, the hint that the commissioning of Dhruva is a major step in India's nuclear bomb programme is wholly irrelevant, the source said.

It is true that the plutonium produced in Dhruva would not be subject to safeguard regulations of the International Atomic Energy Agency as the reactor is built entirely with indigenous efforts. But,

the source said, the plutonium produced from the 35-year-old cirus research reactor at BARC and the MAPP at Madras was also equally free from these regulations. India was a sovereign country and it was free to use its own plutonium produced by indigenous efforts for whatever purpose it preferred to, the source said.

A significant point stressed by another scientist was that to relate Dhruva to India's nuclear bomb programme was actually to undermine and underplay the achievement of the Indian scientists in designing and constructing this complex reactor. Dhruva signifies that Indian nuclear research programme has come of age and that India now need not depend on other countries for basic nuclear research. In Dhruva, Indian scientists and technologists have displayed that they can handle successfully the most complicated task in the field of nuclear research. To brand Dhruva as a bomb-maker is merely diverting global attention from India attaining maturity in nuclear research, the scientist added.

Dhruva is a 100-MW, heavy water-cooled and moderated natural uranium reactor. It is one of the few high-flux neutron reactors in the world. This facility will help increase production of such isotopes as iodine-131, chromium-51, and molybdenum-99, which are in great demand in medical diagnosis therapy. It will also help produce such isotopes as iodine-125, which is now being imported.

Plutonium is a by-product which is produced when uranium undergoes fission. Thus, the spent fuel rods of nuclear power reactors, too, yield plutonium. Tarapur, Rajasthan power project and MAPP have all been producing plutonium besides cirus. Summing up his observations, the scientist said Dhruva was not a big jump in India's atom bomb programme. Instead, it was a giant leap forward in the country's nuclear research programme, for Dhruva's contribution to India's plutonium production would not be very significant considering the capacity of other reactors in the country.

INDIA

KALPAKKAM SECOND UNIT GOES CRITICAL, DETAILS

New Delhi PATRIOT in English 13 Aug 85 p 5

[Text]

Kalpakkam, Aug 12 (UNI)—The 235 MW second unit of the Madra atomic power station at Kalpakkam, 60 km from here, went critical at 1325 hrs today, marking another milestone in the indigenisation of the country's nuclear power programme.

Commercial production of power from the Rs 127 crore second unit is expected to commence by December.

The smooth operation of achieving a self-sustained atomic chain reaction was watched by top scientists of the Nuclear Power Board, including chairman MR Srinivasan and MAEP director K S N Murthy.

One of the major improvements expected in the second unit is the stainless steel end shields of the cladding in place of carbon steel which would prevent leakage and ensure a long life. A top scientist said end shield leakage had resulted in the shut-down of MAPP-I.

The term critical denotes a condition in which a chain nuclear reaction is being sustained at a constant rate and that the unit is self-sustaining.

The first 235 MW unit of the MAPP, the third nuclear power plant in the country, went critical on 2 July, 1983. The unit was formally commissioned by the late Prime Minister Mrs Indira Gandhi.

Commercial production of the unit started in January 1984 when regular flow of power to the Tamilnadu grid began.

The second unit was originally planned to reach critical in December 1984 but was delayed by seven months.

Work on the Kalpakkam plant began in 1971. But after the 1974 peaceful nuclear explosion at Pokharan, supply of nuclear equipment to India was stopped by some countries.

Following this India had to redesign the plant.

CSO: 5150/0059

INDIA

COLOMBO SEEKS INDIAN AID IN BUILDING REACTOR

Madras THE HINDU in English 9 Aug 85 p 9

[Text] Sri Lanka has asked India whether it would help build a nuclear research reactor in the island.

The Sri Lankan request came up during the visit to India last week of a high-level Sri Lankan delegation which was led by the noted scientist, Dr. Cyril Ponnampereuma, now scientific adviser to the President, and included the head of the nation's atomic energy agency.

If the proposal, which is now under the consideration of the Government of India, goes through, it will be a historic event--the first export of a nuclear reactor from India. Though many of India's nuclear installations are not subject to international safeguards, any reactor that it might export will attract safeguards administered by the International Atomic Energy Agency. (IAEA)

Sri Lanka is seeking to build a reactor similar to the Apsara research reactor, a forerunner to the Dhruva reactor which was commissioned today. The Apsara is an enriched uranium, light-water moderated reactor, a model that is commonly used in the nuclear power programmes in the United States, France and the Soviet Union. The one MW reactor, which was built in 1956, is being used for basic research in physics and chemistry and producing radio isotopes used widely now in industry and for medicare.

No infrastructure at home: For a long time, Sri Lankan scientists have been settling down abroad because there has been no adequate infrastructure to do research at home. Recently, the Sri Lankan President, Mr. J. R. Jayewardene, invited Dr. Cyril Ponnampereuma, who was with the University of Maryland in the United States, to come down and start an institute of fundamental studies in Sri Lanka on the lines of the Tata Institute of Fundamental Research (TIFR). It was in pursuit of this idea that Dr. Ponnampereuma's delegation visited the scientific establishments here, including the Bhabha Atomic Research Centre (BARC) and the TIFR.

Sri Lanka's n-power programme: Briefing newsmen later, Dr. Ponnampereuma said that Sri Lanka planned to launch a nuclear power programme soon and he hoped that nuclear energy would become available by 1995 when the nation's hydro-electric energy sources would need to be complemented. In this venture, he said, Sri Lanka looked up to India for cooperation.

In the past, several countries have sought Indian help in setting up nuclear research and even power reactors. But the Indian nuclear establishment which was beset with its own problems had not been quite ready then to turn its attention abroad.

Effective substitute fuel: But now these clouds of doubt appear to have lifted. On the one hand, the nuclear industry has gained substantial momentum with the successful operation of the indigenous Kalpakkam power station, and, on the other, trials have shown that a mixed oxide fuel, a mixture of plutonium and natural uranium, can be an effective substitute.

CSO: 5150/0054

INDIA

BRIEFS

GANDHI ON HIROSHIMA--New Delhi, 6 Aug (PTI)--The Prime Minister, Mr. Rajiv Gandhi, said today that people of the world must rise to assert themselves against the unmitigated evil of nuclear weapons. "We must redouble our efforts to completely eliminate nuclear weapons and to secure concrete measures for disarmament," the Prime Minister said in a statement on the occasion of the 40th anniversary of the Hiroshima holocaust. He said the promise of the United Nations could only be sustained by active commitment on the part of all nations of the world. Mr. Gandhi said the use of the atomic bomb on Hiroshima brought a wholly new dimension to the extent to which man was prepared to destroy man in order to secure victory in war. It also introduced a fundamental change in the nature of the world. "Today, by a strange reversal of logic, nuclear weapons of ever-increasing destructive capability are being produced and stockpiled on the ground that they preserve stability and peace in this world. Can there be any legitimacy for the possession of such weapons? Can their use be ever justified under any circumstances?" Mr. Gandhi asked. [Text] [Bombay THE TIMES OF INDIA in English 7 Aug 85 p 1]

RADIATION STERILIZATION PLANT--Bangalore, 10 Aug (PTI)--The Bhabha Atomic Research Centre (BARC), Bombay, is setting up a Rs. 60-lakh gamma radiation sterilisation plant here in collaboration with the Kidwai Memorial Institute of Oncology (KMIO), Dr. V. K. Iya, director, isotope group, BARC, said today. The plant, the first one outside the BARC, will cater to the product sterilisation needs of hospitals, and industries in south India, Dr. Iya said. He was addressing a seminar on Radiation sterilisation of medical products" at KMIO. Dr. Iya said the plant design would be completely indigenous using knowhow developed at the BARC. [Text] [Bombay THE TIMES OF INDIA in English 11 Aug 85 p 7]

URANIUM DEPOSIT MINED--Karwar (Karnataka), Aug. 11 (PTI): Uranium extraction has begun in the Arabail Ghat region in Uttara Kannada district, according to official information reaching here. This region has 3,000 tonnes of uranium deposits against an estimated 17,000 tonnes of deposits in the country. Prospecting for uranium in the area has been in progress for the past four years. [Text] [Calcutta THE TELEGRAPH in English 12 Aug 85 p 4]

HEAVY WATER PLANS--New Delhi, 7 Aug (UPI)--The department of atomic energy has drawn up a plan for producing 13,000 tonnes of heavy water to meet the target of 10,000-MW power generation capacity by the end of the century. According to the department's annual report, some more plants based on monothermal ammonia hydrogen exchange process with synthesis gas from fertiliser plants as feed will be set up. Also to be set up are one or two independent monothermal ammonia hydrogen exchange process plants with water ammonia exchange as front end and at least one 4000-tonnes-a-year heavy water plant, based on hydrogen sulphide water exchange. Design work has also been taken up on heavy water plants based on ammonia hydrogen exchange independent of fertiliser plants. One more 100-tonne heavy water plant, identical to the Thal plant, is proposed to be set up at Hazira, Gujarat, the report said. The 110-tonne heavy water plant of the Thal Vaishet project is expected to be commissioned in 1987. The 185-tonne heavy water plant of the Manuguru project is expected to start production by 1988. The Talcher plant has established hydrogen exchange process for the production of heavy water and the Kota plant is expected to be restarted shortly after checks indicate that the plant will meet all the stringent safety requirements. [Text] [Calcutta: THE TELEGRAPH in English 8 Aug 85 p 5]

CSO: 5150/0053

ISRAEL

'SERIOUS DIFFICULTIES' IN FRENCH NUCLEAR DEAL

TA031056 Tel Aviv DAVAR in Hebrew 3 Sep 85 pp 1, 2

[Report by political correspondent Yosi Melman]

[Text] The negotiations over the supply of nuclear reactors by France to Israel have run into serious difficulties. This was reported by sources in the French Socialist delegation that ended a 1-week visit to Israel 2 days ago.

The 250-member (as published) delegation included Parliament members, senators, mayors, and two ministers. Georges Lemoine, secretary of state in the Ministry of the Interior and of Decentralization for Overseas Territories, who headed the delegation, refused to comment on the issue of the reactors. He told DAVAR, however, "that the negotiations are difficult and complicated, and they face serious problems."

It has been learned that the French Government does not believe Israel can finance the purchase of the two nuclear reactors it wanted to buy. Moreover, Arab countries are exerting diplomatic pressures on France not to sign the deal with Israel. This is what Minister of External Relations Roland Eumas heard during his recent visit to Saudi Arabia.

This month King Fahd is due in Paris, and he intends to request that President Mitterrand halt the negotiations with Israel. The U.S. Government is also against the deal, because it believes that Israel's present economic situation does not allow it to enter into such complicated deals. Energy and Infrastructure Minister Moshe Shahal refused to comment on the report or to discuss the negotiations on this issue between the two countries.

CSO: 5100/4505

PAKISTAN

TWO VIEWS OF PAKISTAN'S NUCLEAR PROGRAM

An Indian View

Islamabad THE MUSLIM in English 9 Aug 85 Magazine p 3

[Commentary by K. Subrahmanyam: "Why Pakistan Wants the Bomb"]

[Text]

Pakistan's attempt to acquire a nuclear weapon capability is being condemned in various parts of the world (especially in the western industrial world and also in India) as being unethical and irrational. In the American media, Pakistan is portrayed as attempting to steal secrets and circumvent export regulations of other countries in order to advance its nuclear programme. In this country too the Pakistani effort is viewed in emotional terms.

One section of people in our country would attribute the origin of Pakistani sin as a response to the Indian sin (the Pokhran explosion) and exhort that both of us should jointly expiate our sin. Such emotional approach does not help in resolving the issue or offering a sound basis for policy making. Pakistani action may have an adverse impact on our security but that does not necessarily make it unethical. If the issue of danger and insecurity arising out of nuclear weapons is to be tackled, it has to be done on a rational basis taking into account the global strategic environment and cannot be tackled merely between India and Pakistan even if there is an abundance of goodwill and mutual trust, which of course are unfortunately not there at this stage.

If I were a Pakistani I would have opted for the bomb and I find the Pakistani decision rational and sensible in their circumstances.

Both India and Pakistan are agreed that the use of nuclear weapons should be declared a crime against humanity and they ought to be banned. Pakistan has repeatedly voted in the UN for a resolution to that effect, moved initially by India and subsequently adopted by the non-aligned nations as a whole. While 126 nations, including China and the Soviet Union, are for the resolution, the NATO countries have been persistently opposing it, arguing that they need to rely on the nuclear deterrence doctrine and the threat of use of nuclear weapons for their security. The global strategic norms are unfortunately laid down by the western nations. If nuclear weapons and nuclear war doctrines are legal and ethical for them, only racist arrogance and selfrighteousness make the western media portray that developing nations should not have the nuclear weapons while the western countries have an unlimited right to proliferate. Unfortunately many Uncle Toms in the developing world, including our own country, accept uncritically the thesis that nuclear weapons are all right in the hands of the white sahibs but not in the hands of brown and black nations.

LEGITMACY

Some virtuous people argue why we should follow the bad example of industrialised nations and have these weapons. Since we proclaim that we prefer nuclear disarmament why don't we practise what we preach? The real world is more complicated than that. The law does not permit killing but it

permits the right of killing in self defence. Working for nuclear disarmament and at the same time having nuclear weapons to safeguard the national interest and security of one's own country in a world of sky-rocketing nuclear proliferation are not contradictory. That is the position of China and the Soviet Union and if the west would accept the position that, use and threat of use, of nuclear weapons are illegitimate and they should be banned then there will be no common ground to initiate steps for nuclear disarmament. Such common ground exists for bacteriological weapons (which have been outlawed), chemical weapons (for which there is a Geneva protocol and further negotiations are taking place to ban them) and for radiological weapons (to ban which negotiations are taking place too). So long as nuclear weapons are deemed legitimate, Pakistan has as much right to have them as the US, the UK, France, Soviet Union and China. Those who warmly endorse the Non-proliferation Treaty should recognise that the treaty is the fountainhead of legitimacy of nuclear weapons.

JUSTIFICATION

The western justification for nuclear weapons is that they face the larger conventional forces of the Soviet Union and hence they need the nuclear weapons. This is asserted in spite of the fact that in history the Russians and Americans have never fought a war (except for a brief clash in Siberia in 1918) and for the last 40 years peace has prevailed in Europe. The western strategists argue that peace has prevailed mainly because of nuclear deterrence. The Pakistanis may well say that they face the Soviets in Afghanistan and Indians in the east and both Soviet Union and India are more powerful nations which can be deterred only by Pakistani nuclear weapons. Since there have been three wars between India and Pakistan in the absence of nuclear deterrence, in Pakistani perception, nuclear deterrence may be able to bring about peace and stability as it is claimed to have done in central Europe and along Sino-Soviet borders.

It is argued that nuclear weapons do not increase security and a miniscule nuclear arsenal against the vast arsenals of others does not constitute an adequate deterrent. The first part of the argument is totally rejected by the NATO, Warsaw Pact countries and China whose experience is that nuclear weapons have ensured their security and have stabilised the situations in central Europe and along the

Sino-Soviet border. The second part of the argument is also not accepted by France, China and Britain. France can be wiped off the face of the earth in a few minutes by the Soviet arsenal and so can China. But in the process some two or three Soviet cities will get destroyed. While the wiping off of France and China would benefit the Soviet Union, the loss of two cities will hurt and no rational Soviet decision-maker will consider sacrificing two or three of his cities even to destroy the whole of France or China. This in the strategic parlance, is called proportionate deterrence. A bee dies when it stings. No human being thinks of going and tangling with the bees and subjecting himself to the discomfort of a bee-sting though the bee will die in the process. The probability of destruction of two or three Soviet or Indian cities and the uncertainty involved would be adequate deterrence for Pakistan. Even today China practises only such proportionate deterrence vis-a-vis the Soviet Union. The US strategists have tried to propagate that no nuclear arsenal other than those of the two super-power arsenals is credible. But in practice the US behaves differently. Of late the US strategy is shifting from treating certainty as the basis of credibility for deterrence to uncertainty as the basis.

RATIONALE

Some of the American strategists who are more perceptive, understand these nuances and they have tried to explain the rationale underlying the Pakistani nuclear strategy. Prof. Stephen Cohen points out: "Pakistan belongs to that class of states whose very survival is uncertain, whose legitimacy is doubted and whose security related resources are inadequate. Yet these states will not go away nor can they be ignored. Pakistan (like Taiwan, South Korea, Israel and South Africa) has the capacity to fight, to go nuclear, to influence the global strategic balance (if only by collapsing) and, lastly, is in a strategic geographical location, surrounded by the three largest states in the world and adjacent to the mouth of the Persian Gulf. . ." Pakistan is following the successful examples of Israel and South Africa in following a policy of deterrence through nuclear ambiguity.

Unlike the Fifties and Sixties, the cost of nuclear weapons in relation to that of non-nuclear ones, has tended to come down. Secondly, a nuclear arsenal, though it may not be up-to-date and modern (as China's is not) is able to deter

adversaries both against nuclear and conventional attacks mainly through the uncertainty involved in the proportionate deterrence. Otherwise China will be totally helpless against the awesome nuclear arsenal of the Soviet Union and its enormous conventional fire power. Pakistan understands well that it cannot compete with India in terms of sophisticated conventional weapons or nuclear weapons in the coming decades. China has failed to come to the rescue of Pakistan both in 1965 and 1971. Given the delicate triangular relationship Pakistan has with Iran and the Arabs and the possibility of Arab monetary support drying up, going nuclear makes eminent sense for Pakistan to sustain its security and sovereignty. That India may proclaim from house-tops its good intentions vis-a-vis Pakistan, has no bearing on these security calculations. In India we are obsessed with Pakistani accusations against India and have a sense of guilt. But India is only one factor in Pakistani security calculations. It has far more complex problems of security vis-a-vis Afghanistan and Iran about which it does not dare say much in order to maintain the image of Islamic solidarity. Pakistan's offer of pie-in-the-sky proposals of mutual inspection to India when they will not even give details of their budgets, plans, programmes, etc. relating to atomic energy is only to ensure that it can continue with its posture of nuclear ambiguity which it vitally needs to face problems of security other than India. At present India may be the biggest factor in Pakistan's security calculations but as Prof. Stephen Cohen has rightly pointed out, Pakistan is in a vital geostrategic location and India may not, in the long run, prove to be its main security preoccupation.

Pakistan does not have the basic stability of India, since as a nation-state it is conceived in terms of Punjabi domination over the rest just as the Chinese state is. In such circumstances it is natural for the majority to think of a symbol of power to dominate over. The nuclear weapon serves this purpose for China and Pakistan. The nuclear capability was described as the 'sword of Islam' by Bhutto who thought in terms of civilisation when he wrote that only the Islamic civilisation was without any nuclear capability. That position was about to change due to his efforts. When that happens Pakistan will have a commanding position in the Islamic world which should in turn give it political and economic benefits.

WORRY

One may ask whether the fall-out of nuclear war should not worry the Pakistanis. Not more than it worries the people and leaders of the industrialised world which have built massive arsenals.

People ask in pious horror what would have happened if Iran and Iraq had nuclear weapons. The answer is in that case there would have been no Iran-Iraq war as the European and American nations which killed 70 million people only 40 years ago and nearly 100 million people in the first half of this century have stopped fighting in their national territories under the threat of nuclear annihilation. The Americans and Europeans have not stopped fighting. Most of the 20 million people killed in the 150 conventional wars and instances of major violence in the developing world since the Second World War (a charge continuously hurled at the developing world and about which many of our Uncle Toms feel very guilty) were killed by Americans and Europeans in Korea, in Indo-China and in the anti-colonial wars of Algeria, Mozambique, Angola, Zimbabwe and elsewhere. More explosives were dropped on three Indo-Chinese states between 1965 and 1978 by the Americans than were manufactured in all history up to that point of time. If the Nuremberg laws and the Yamashita judgement were made applicable in the post World War II era, many presidents, prime ministers, foreign and defence ministers and chiefs of staff of the leading white nations would have mounted the scaffold. The holocaust in the developing world carried out with weapons manufactured in the developed world and actually fired by the troops from the developed world is not even recognised. The risks of a nuclear weapon being used irrationally by a Zia-ul-Haq or a leader of the developing world are not higher than those in respect of leaders of the five established nuclear weapon powers and their armed forces at a time of crisis. The Indo-Pakistan wars were fought in a far more civilised manner than wars in Indo-Chinese countries, Algeria and elsewhere.

In such circumstances it should not be surprising if Pakistanis feel confident that nuclear weapons in the subcontinent will be used only to sustain deterrence and not used operationally. Therefore the nuclear option for Pakistan does not have very high risks.

COUNTERACT

Pakistani nuclear capability poses a problem for India and India has to counteract effectively to safeguard its own security and interests. But neither shrill invectives on Pakistan's unethical conduct nor a sentimental call for both countries to renounce nuclear weapons (totally ignoring Pakistan's other security problems) are going

to be of much help. Those who argue in favour, of the latter, including the Pakistanis if they're sincere, have not thought about Pakistan's security problems. On the other hand I suspect the Pakistanis have thought through their security problems, have chosen rationally their nuclear option but are insincere in their offer to renounce the weapon along with India. With some sophisticated diplomacy their bluff can easily be called.

Scientist Spurns Defense

Islamabad THE MUSLIM in English 17 Aug 85 p 4

[FORUM column: "Pakistan's Nuclear Programme"]

[Text]

IN THE Magazine Section of the Daily Muslim of 9.8.1985 an article entitled "Why Pakistan Wants the Bomb - An Indian View", written by the notorious Indian "Josef Gröbbels", K. Subrahmanyam was published. He had published the same article earlier in the Indian Weekly "Sunday", Calcutta of July 7 - 13, 1985. This gentleman is well known for his notorious role in the Indian aggression against East Pakistan. All his life and work is devoted to aggressive and degrading writings against Pakistan. Since I have lived with such extremist Hindus during my early days I am fully aware of the hatred they earned against the Muslims in general and against Pakistan in particular.

In the said article Subrahmanyam has tried, rather naively, to put his own words in our mouths. He has given reasons, his personal ones, why Pakistan wants the bomb. He has used all imaginative arguments as incentives for Pakistan to go nuclear. This article reminded me instantly of the famous and popular T.V. series 'Andhera Ujala' written by Younus Javed. You notice in this series Inspector Jaffar Hussain managing to get the crooks/criminals to agree to either give him some money or share the loot. After a lot of subtle and sometimes rather rough persuasion, the crook says in confidence, "My neck will be saved, of course," or "you can keep half of the booty". No sooner is the confession uttered than Jaffar Hussain grabs the crook by the neck and gives him a real thrashing, at the same time taking out the cassette recorder from under the desk. Now Subrahmanyam seems not even to possess intelligence enough to see

that the game he is trying to lure us into, and to trap us in, is an everyday game written by our own Younus Javed and shown to millions of T.V. viewers. He wants to thrust a confession in our mouth and then to dance around to ridicule us. He should have come out with some original idea to make a fool of us. And as far as we are concerned, we do not even need some sophisticated diplomacy or above-average intelligence to call his bluff.

You can imagine the "intelligence" of this "Chanakya" and his Prime Minister from the remarks that India does not want to agree to mutual inspection of each other's nuclear facilities because it suspects that Pakistan might have tucked away one or two bombs somewhere. This ignorant reasoning, shows the intellectual calibre of this so-called Scientist-cum-Analyst and his Prime Minister whose educational and professional background is no secret to us. A country that exploded a nuclear bomb (we do not differentiate between a device and a bomb) 11 years ago, has a large number of unsafeguarded facilities exclusively for the use of nuclear weapons and is almost 4 times as big as Pakistan, can understandably tuck away many more weapons than Pakistan. All this nonsense boils down to confirming the old, well-established fact that this gentleman and his masters are still sticking, in letter and spirit, to the advice given by their foxy Chanakya to tell lies, cheat and betray the trust if it is considered in the national interest. Don't we remember how Gandhi and Nehru went back on solemn commitments made to us, and to the international community?

Now coming back to our own nuclear programme, our government has made it very plain that our modest programme is solely for peaceful purposes and that we are one of the staunchest supporters of non-proliferation of nuclear weapons. In a recent interview to Tom Brokaw of NBC, our President categorically stated that Pakistan had neither the intention nor the capabilities of having a nuclear bomb. He informed Brokaw of the many initiatives which Pakistan had taken so far. These included the proposal to declare South East Asia a nuclear-weapon-free zone, to sign the Nuclear Non-Proliferation Treaty together with India, to sign a bilateral nuclear non-proliferation treaty with India, to agree to an international inspection team to inspect each and every nuclear facility in each of the two countries, and to renounce the use of nuclear weapons. Unfortunately, and understandably, the Indians have not accepted any one of these sincere and straight-forward proposals. If the Indians and their Guru Subhrahmanyam are so peace-loving, so opposed to the manufacture and possession of nuclear weapons, they should show their sincerity and come forward to join hands with Pakistan for the safety and betterment of our beautiful world. Why is India so reluctant and afraid? The simple reason is that India has never been sincere and honest with regards to her nuclear programme. First they cheated Canada, the USA and the whole world and now they are again engaged in taking them for a ride. Our proposals and efforts are sincere and our President has challenged India to try him on any one of the proposals suggested by him and see if we are sincere or not in our efforts. Our President has made it very plain that Pakistan wants nuclear non-proliferation to exist and be strengthened, and humanity to be saved from a holocaust. Let the world intelligentsia judge itself whether it is we or Subhrahmanyam whose bluff has been called, and that too without any sophisticated diplomacy or above-average intelligence. DR. A. Q. KHAN, Kahuta

CSO: 5100/4784

PAKISTAN

MINISTER CHARGES 'INDIA THREAT TO NUCLEAR-FREE ASIA'

GF300910 Karachi DAWN in English 20 Aug 85 pp 1, 10

[Excerpts] Islamabad, Aug 19: The Minister of State for Foreign Affairs Mr Zain Noorani today said the real threat to a nuclear-free Asia comes from India which has the admitted capacity and capability to produce nuclear weapons and insists on keeping its options open.

"Pakistan has neither the capability nor the intention to produce nuclear weapons and is, moreover, willing to close the option and join India in assuming binding international obligations to renounce the nuclear option," he added.

Mr Noorani made this statement on two adjournment motions in the National Assembly by Mr Mumtaz Ahmed Tarar (Gujrat) and Mian Mohammad Zaman (Okara) on a reported statement by Indian Minister of State for Foreign Affairs, Mr Khursheed Alam Khan on the nuclear issue.

Mr Noorani said that while the real threat to nuclear-free Asia comes from India, it is ironic that India should cast suspicions on Pakistan. Its false allegations against Pakistan are diversionary aiming at deflecting attentions from India's own programme. Instead of taking effective steps to prevent India from undermining the non-nuclear regime in South Asia, world opinion is being misled by motivated propaganda to misdirect its pressures on Pakistan.

Mr Noorani said Pakistan's own position is clear. "We firmly hold the view that a non-nuclear regime in South Asia will be in the best interest of all. The Government of Pakistan has on several occasions invited the Government of India to join Pakistan and other likeminded states in a treaty renouncing nuclear weapons." To this end Pakistan has put forward the following concrete proposals:

- Simultaneous adherence by Pakistan and India to the Nuclear Non-Proliferation Treaty.
- Acceptance by both countries of full scope safeguards of IAEA.
- Establishment of nuclear weapon-free zone in South Asia.
- A declaration by India and Pakistan jointly renouncing the acquisition or production of nuclear weapons, or
- Reciprocal inspection of each other's nuclear facilities.

He said "unfortunately, the Government of India has not so far given a positive or constructive reply to Pakistan's proposals. Nor has it come forward with any proposal of its own which could reassure that India will not go back on its declaration of intent not to produce nuclear weapons."

CSO: 5100/4782

PAKISTAN

INDIAN ATTITUDE RESENTED

GF171406 Islamabad THE MUSLIM in English 13 Aug 85 p 4

[Editorial: "India's Nuclear Designs"]

[Text] While India continues to cavil at Pakistan's efforts to exploit its modest nuclear facilities to augment the production of electrical energy and keep the wheels of the country's industry moving, its own nuclear research reactor in Bombay has acquired the capability of producing weapons grade plutonium in massive quantities.

Named "Dhruva", the reactor is claimed to be a major plutonium producing facility to serve as fuel for its second generation fast-breeder reactors. Yet it maintains that it has no nuclear weapons in its arsenal and that it is Pakistan which is busy fabricating a bomb. The director of the 100-megawatt Bhabha Atomic Research Centre has said that "Dhruva" is the sixth and largest reactor of the centre, and that all its systems are indigenously designed, built and commissioned.

India said the other day that it was closely watching Pakistan's attempts to make nuclear weapons and keeping its options open on counter-measures. Pakistan has not remained under any illusion about the designs of its bigger neighbour which has just claimed that "our capacity and capability should not be underestimated. We have our capacity but we don't have to display it as some others are doing across the border". Again, according to the widely circulated *INDIAN EXPRESS*, the reactor is capable of churning out enough weapons grade plutonium to fuel 30 nuclear bombs. That the acquisition of such horrendous nuclear capacity by India poses a grave threat to the security of the smaller states across its borders is too obvious to be emphasised.

In view of this and the veiled hints that India may resume bomb-making, it has become imperative for these states to strengthen their defences and remain ever alert to the danger lurking at their doorsteps. Nobody can object if they take whatever steps they consider necessary to ensure that their safety is not jeopardised by any over-ambitious power in the region.

CSO: 5100/4777

PAKISTAN

INDIAN COMPLAINTS, MOTIVES QUESTIONED

GF181536 Karachi Jasarat in Urdu 11 Aug 85 p 3

[Editorial: "What Justification Does India Have?"]

[Text] Kurshid Alam Khan, Indian minister of state for foreign affairs, has said: "Pakistan believes that it is far ahead of India in nuclear capability, but these people will come to their senses when they know of Indian capabilities." In his speech to parliament he added: "On the matter of security, India is not helpless vis-a-vis Pakistan. India does not need a nuclear security umbrella to deal with any possible nuclear attack from Pakistan, but no one should misunderstand about the power that India can wield. It is not in India's national interest to say anything about Indian nuclear capabilities. India is quite free in its nuclear program." He said this in answer to questions in the Indian parliament related to steps that India has taken to face Pakistani nuclear threats.

The speech by the Indian minister of state in parliament is an excellent example of the contradictions in the usual accusations against Pakistan to threaten Pakistan and to challenge its independence. For example, Khurshid Alam Khan has said India did not need any nuclear security umbrella against nuclear threats from Pakistan and at the same time he boasted that India had revealed its nuclear capabilities in 1974. He also said: "If Pakistan learns about Indian nuclear capabilities it would come to its senses. That is what I mean by a nuclear umbrella."

This statement clearly shows that India is totally prepared in the nuclear field even though he said that its use was only to counter nuclear threats from Pakistan. In any case, India does not now conceal the fact that it tested an atomic device in 1974. However, India does not say who it was afraid of when it tested the atomic device.

If Pakistan is unaware of Indian nuclear capabilities, it has at least some idea of it. Nevertheless, Pakistan has not lost its senses and is not like India, clamoring for nuclear arms. Of course, India is free in its atomic program. According to Khurshid Alam Khan, Pakistan cannot deviate India from this path. Indian policy has always been that it does not reveal to anybody the path it has selected. It always tries to tell the world that it is following some other path. For example, India has always said that it will never follow the nuclear path; in the meantime it exploded an atomic device in 1974. Regarding its present preparedness and capability in the nuclear field, this statement by the minister of state is sufficient that "Pakistan will come to its senses."

It is now known that India has acquired the capability to process plutonium. Its sixth atomic reactor has begun operating in the Bhabha research center near Bombay. This was constructed by India and is considered one of the biggest reactors in the world. One can realise the absurdity of India saying that all this preparedness was being done to guard itself against threats from Pakistan.

Indian parliament members also refer to the Pakistani atomic program and press the government that India should also make atom bombs because, they say, an atom bomb can deal with all dangers. They do not realise where India would like to drop the bomb and what would be the world reaction to it.

The question is, if India is far ahead of Pakistan in the nuclear field, then what justification does India have in raising a hue and cry over the Pakistani nuclear program?

CSO: 5100/4777

PAKISTAN

SOUTH PACIFIC NUCLEAR FREE ACCORD WELCOMED

BK221652 Karachi Domestic Service in Urdu 1500 GMT 22 Aug 85

[Text] Prime Minister Mohammad Khan Junejo has sent messages to the heads of governments in the South Pacific Forum welcoming the adoption of a treaty establishing a nuclear weapons-free zone in the South Pacific. The prime minister said Pakistan has consistently supported creation of nuclear weapons-free zones in various regions of the world as an important means to promote regional and international security and the objective of nuclear nonproliferation. We have followed with close interest the endeavors of South Pacific nations to establish a nuclear weapons-free zone in their region.

He said the Government of Pakistan, therefore, warmly welcomes the decision of the South Pacific countries to establish this zone where use, ownership, or stationing of nuclear weapons will be prohibited.

The prime minister said the political foresight and wisdom demonstrated by South Pacific leaders is worthy of international admiration. Pakistan shall cooperate with South Pacific countries in securing universal acceptance of this denuclearized zone, in particular by the nuclear weapons states.

Mohammad Khan Junejo said it is also Pakistan's hope that the example set by South Pacific will inspire countries in other parts of the world, including South Asia, to cooperate with each other in creating nuclear weapons-free zones in their regions.

The messages have been sent to the heads of government of Australia, [name indistinct], Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, and Western Samoa.

CSO: 5100/4777

PAKISTAN

SMALL NUCLEAR FORCES DEVELOPMENT IN SOUTH ASIA REVIEWED

Lahore THE PAKISTAN TIMES in English 16 Aug 85 Magazine pp I, IV

[Article by E.A.S. Bokhari]

[Text]

AS COMPARED with the exclusive club of the five, i.e., the USA, the USSR, France, the U.K. and China, the SNFs (Small Nuclear Forces) in the Middle East and South Asia (India and Pakistan) are puny due to the technological gap and procurement problems of fissile material. (Any country which can muster up to say, five or six nuclear - atomic - warheads by the year 2000 falls within the SNF category). It is unlikely that these countries would catch up with the Big Five (India probably would be nearer them) in the production of ballistic missiles, especially ICBMs - both strategic, i.e., those with more than 5000 - km range or Theatre missiles with range up to 2500 km - due to the problems of the available delivery systems launchers.

Even SLBMs and Cruise missiles may be futuristic for some of these countries due to the 'cloak and dagger' smuggled and derived nature of their technologies, the organic base being somewhat primitive.

Some of these countries may, however, be at the threshold of ICBM technology by the turn of the century.

The three major countries of SNF potential are India, Israel and Pakistan in that order of development. A recent lead article in Time Magazine (June 3, 1985) has overplayed Pakistani utility at Kahuta, though India had exploded an underground nuclear device way back in 1974 by Rathan (Thor). Of course, for much too close a U.S. ally to U.S. interests in the Middle East - being their most reliable satellite there - she commands access to the latest U.S. technology in some way.

For obvious reasons any country that goes nuclear and develops SNF has to obtain not only the nuclear warheads, but also the means of delivery and a fool-proof system of positive command and control (C³I) over this deadly ware. Development of SNF will perforce depend on national defence/security policy goals linked to the possible enemy strength and capabilities. Again, a rough cost-benefit calculation will also be necessary before a country develops SNF.

Let us first of all go into the delivery systems and Atomic Demolition Mines (ADMs). India, for example, might place remotely-controlled ADMs in Himalayan mountain passes as nuclear barrier against Chinese incursion (of the October 1962 type). Iran and Pakistan might see some use in such technology against Russia. So would some important oil-producing countries in the Gulf region who would place ADMs on strategic and key points in their areas.

Continuing with the delivery systems, there are a number of high-performance nuclear-capable aircraft in the region. Even some more advanced and sophisticated ones are to be introduced into the air forces of these countries in the next two decades or so. Dual-capable ballistic missiles are also fast spreading in the area. The range of these systems is good enough for deep penetration into the air space or territory of each other's traditional adversaries. With air refuelling or conformal fuel tanks, further increase in range can be achieved, sometimes twice as much.

The Soviet supply of MIG 23s to Iraq, Syria, Libya and India could have a nuclear combat radius of up to 450 miles - well in excess of the distance between Delhi and Islamabad. F-16 and Mirage 3 can operate out of 600 miles or more - roughly the distance between Tel Aviv and Benghazi. Both the USA and the USSR have transferred short-range SSMs (Surface-to-Surface Missiles/Ship-to-Ship Missiles) to the countries in these regions. Although these missiles primarily use conventional warheads, these could use nuclear warheads too. These weapons, however, are not very reliable as nuclear weapons systems. Soviet and FROG SCUD have been supplied to Libya, Egypt, Iran and Syria with a nuclear payload range of 40 to 175 miles respectively. U.S. SSM Lance sold to Israel has a range of 75 miles. Soviet SA-2 SAM (Surface-to-Air Missile) could be converted to nuclear role. The Israeli nuclear-capable Jericho SSM has a range in excess of 300 miles. A further generation of Jericho, i.e., Jericho II, is to range up to 600 miles.

India has already flight-tested a space launcher - a very significant technological breakthrough - which if used in an SSM could lift a nuclear payload about 300 miles. India is also developing space launchers to deliver nuclear payloads to about 2,000 miles (perhaps in the 1990s) to bring the major Chinese cities within range. The Saqr SSM, under development in Egypt, till recently, is to have a range of 350 to 400 miles.

Dependence on aircraft

It is likely that the SNFs will depend more on the high-performance aircraft than ballistic missile as missiles are not reusable any way, besides being somewhat inaccurate. Aircraft are more reliable, recallable and not expendable like the missiles. As to India, due to geographical considerations, she will definitely have to go for a ballistic missile. In some countries, even Cruise-type missiles may be considered for development. "If SNFs appear in the Middle East and South Asia, they are likely to be quite fragile initially, especially in command and control links. Asymmetries in SNF capabilities between one country and another probably would be pronounced. Aircraft-based SNFs could pose considerable threats to each other's survivability under surprise attack conditions. SNFs would also threaten the survivability of the communications links in rival command and control systems."

Proliferation invokes stavistic fears and uncertainties, as it involves arcane and highly sophisticated technologies: breeder reactors, plutonium-reprocessing plants, uranium-enrichment techniques, etc. Yet there must be some reliable forecast of the potential and the projections. The forecast of the Centre For Strategic and International Studies, Georgetown University, is contained in the following paragraphs countrywise.

An Israeli SNF will probably consist of not less than 50 nuclear warheads sized to deal with multiple neighbouring threats. It would be primarily based on fighter bomber aircraft and SSMs. Two or three F-15-E squadrons will be equipped and earmarked for the main nuclear delivery. A small force based on Jericho II will be deployed on Golan Heights and in Negev in dual role. It is visualised that Israelis would have Cruise-missile technology in an advanced stage and AWACs of organic origin. They may even use Short Take-Off and Landing (STOL) aircraft to partially offset vulnerability.

The Israeli AWACs is considered to be an improvement upon the present U.S. E-3A Israel developed an atomic weapon way back in 1968 using reprocessed plutonium from their top-secret French-built research reactor at Dimona in the Desert.

SNF inventories in any of the countries - Iraq, Syria, Egypt and Iran - by the year 2000 would not exceed 25 or may be as few as five or 10 - near the lower limit of the designation of SNF. The primary delivery choice will be the aircraft, i.e., one or two squadrons of SU-24 light bombers in Syria and Libya. Iran would probably procure F-14 or Mirage 2000 types when returning to the arms market. Libya's Tajura Nuclear Research Centre is a Soviet built whose state-of-art facilities opened in 1982. One of its building walls is decorated with the representation of the great Russian scientist Mendeleev's periodic tables - the catalogue of elements. Libya, however, is in no way near the goal of making a bomb yet. Egypt may revive the development of its Saqr Missile. Syria, Iraq and Libya may do something similar with Soviet-supplied SSMs. Each would probably have active SSM deployments or high-altitude SAM system conversion programme underway, implying independent SNF missile capability in the future.

Indian projection is much too ambitious. M. Subramanyam, head of India's Institute of Defence Studies and Analyses, has said this about these projections: "I refuse to be an Uncle Tom who would accept the right of white nations to wield nuclear weapons - and have the developing world disarmed and subject to nuclear terror." The Indian SNF it is visualised, will be a two-tiered force both for short-range mission, i.e., against Pakistan and sea-based threats, and strategic missions against China. By the year 2000, the Indian inventory could be

in the region of 200 to 300 with considerable diversified means of delivery and survivability. About 50 to 60 of these nuclear warheads will be earmarked against Pakistan - two or three squadrons of a mix of Jaguar and Mirage 2000 aircraft and several batteries of dual capable SSMs.

Against China, India could deploy at least 20 to 30 long-range SSIs as counter city deterrents. India would by then have long-range medium bomber strike capability (or a medium-range aircraft with ballistic missile to be able to strike at Chinese cities). Such other delivery means as submarine-based or surface ship-mounted ballistic missile against Chinese ships off Tonkin Gulf is another possibility.

Pakistan is a poor competitor in this race. A Pakistani SNF at the very best would be a maximum of 50 warheads committed to Special F-16s - or a latter generation of this or comparable aircraft. Pakistan may by then have a symbolic Chinese-supplied nuclear capable short-range SSMs. Pakistan may have an active ballistic missile development programme. Both these countries only possess a C³I system which is more a derivative/improvement of existing conventional system.

PAKISTAN

BRIEFS

URANIUM DEPOSITS SAID DISCOVERED--Karachi (APP)--According to the Journal of the Pakistan Atomic Energy Commission, digging in Mianwali District has revealed Uranium deposits under the water table, but at a considerable depth. There is enough Uranium [to mine] here, the journal said. Moreover several other Uranium deposits have already been discovered in the country. The Pakistan Atomic Energy Commission has drawn up a comprehensive plan to exploit these deposits, including using Uranium to produce electric energy in Pakistan.
[Text] [Lahore NAWA-E WAQT in Urdu 25 Aug 85 p 8 GF]

CSO: 5100/4783

KENYA

OFFICIAL ON SOMALIA ACCEPTING U.S. NUCLEAR WASTE

EA082006 Nairobi THE SUNDAY NATION in English 8 Sep 85 p 4

[Article by Khakhudu Agunda entitled: "Nuclear Dumping Worries Kenyans"]

[Text] A Kenyan environmental officer has pleaded with Somalia to reconsider its decision to allow the U.S. to dump nuclear wastes in its waters. Mr Samuel Njuguna of Kenyatta University made the appeal yesterday when he called at Nation House to announce that he and five of his colleagues will form a continental body to fight against all sorts of pollution.

Said Mr Njuguna: Nuclear wastes have long-term effects on African countries including Somalia itself. My colleagues and I appeal to the Somali Government to reverse the decision for the good of all the people of Africa.

The dumping of nuclear wastes in Somalia, he said, would mostly affect the neighbouring countries of Kenya and Ethiopia. The underground water of the people of Kenya's north-eastern province in boreholes would be polluted.

Appealing to the OAU and other African governments to bring pressure to bear on the Somali Government. Mr Njuguna wondered why the U.S. which has its own seas and deserts, should dump in Africa. The only reason I can think of is that they know the long-term effects of nuclear waste and would like to dump them as far away as possible from their shores.

The proposed body, the environmental officer said, would be called Do Not Pollute Africa Movement, and would aim at educating people on the dangers of cultural, chemical and ideological pollution in Africa.

CSO: 5100/43

SOUTH AFRICA

FUTURE OF NUCLEAR ENERGY EXAMINED

Johannesburg S.A. MANUFACTURING WORLD in English Jul 85 pp 21-22

[Text]

Consideration of the effect of population growth on electricity consumption, can only lead to some qualitative indications of future demand:

- (i) The population within the borders of South Africa is growing at about 2.8% p.a. This high rate cannot continue, as limitations on water and food supply places a limit on the total number of people which can be accommodated within our borders. This number is commonly estimated at some 80 million by the year 2080.
- (ii) The present annual electricity consumption per capita is about 4 MWh/a. Comparative figures for other countries are as follows:

TABLE 1: Per Capita consumption of electricity

| Country | MWh/a-capita |
|------------|--------------|
| USA | 11 |
| W. Germany | 6 |
| France | 5 |
| RSA | 4 |
| Brazil | 1 |

Our relatively high value derives mainly from the mining and heavy industries and, and because our electricity costs are still amongst the lowest in the world, there is no real incentive for conservation and efficient use. One can, however, expect a rise in per capita consumption as living standards improve.

The minimum situation is based on the assumption that the population will level off at about 80-million by 2080, while the per capita electricity consumption will remain at 4 MWh p.a. This yields an average electricity growth rate of 2% p.a.

Assuming the same limitation as before on the population growth, but that consumption per capita will rise steadily to 8 MWh/a by

2080, the average electricity demand growth rate of 5% p.a. thus obtained, seems to be the most probable.

In the light of the above considerations and assuming that future large-scale expansion of the energy-intensive industries are improbable, and also considering the economic tendencies in South Africa and its main trading partners, as well as the fact that ESCOM's share of electricity generation has already grown from 71% in 1967 to nearly 94% in 1984, an average growth rate of 5% p.a. seems to be the most probable for the coming number of years, if a 1% reduction in demand can be achieved by conservation and more efficient use of electricity.

These predictions do not help to solve ESCOM's problems if high short-term demand growth situations should arise since although it can, and does make provision in its contracts for deferment of the last few sets of each power station, because of the long lead times for power station construction, it is either too expensive or even impossible to provide extra capacity at short notice.

III THE ROLE OF NUCLEAR ENERGY

According to the ESCOM estimates for demand growth rate ²⁾ of 7% until 2000 and 6% thereafter, the amount of coal reserved for electricity generation alone, will amount to 45 000 Mt by 2030. By this date, ESCOM would have consumed a further 12 000 Mt of coal and annual consumption would have risen to some 900 Mt/a. This means that the present known reserves of 57 000 Mt would have been reserved for electricity generation alone.

Unless large new reserves are discovered and become available, the use of very high ash coal becomes possible, or the demand growth rate is drastically reduced, some other means of elec-

tricity generation will have to be used long before 2030.

One must remember that an exponential growth rate of 5% a.a., the doubling time for consumption is some 14 years. A doubling of reserves would therefore only extend the depletion date by 14 years.

The only proven alternative for coal in the foreseeable future is uranium, of which we fortunately have adequate reserves. The present South African reserves of uranium recoverable at the cost of R160/kg U is estimated at some 500 000 tons.

If used in thermal reactors of the Koeberg design, this is equivalent in energy content to some 15 000 Mt of coal, which does not constitute a significant amount. If, however, this uranium is used in fast breeder reactors, of which demonstration units are in operation in the USA, the UK, France and Russia, our uranium reserves will be equivalent to some 900 000 Mt of coal, allowing enough time for the development of economical fusion reactors or of other, perhaps renewable, resources for electricity production. In the absence of such resources, the only alternative in the long term would be the Fast Breeder Reactor.

Nuclear Power Costs

The costs of nuclear electricity relative to the cost of electricity produced by coal, plus transmission costs, will be the decisive factor determining the future utilisation of our uranium resources for electricity generation.

A comparison of nuclear vs coal electricity costs in France are given in Table II. (Nucleonics Week, Dec. 20 1984). From this table it is evident that even at a low load factor of 45.6% (4 000 hrs / a operation) nuclear has distinct advantage over coal in France. This is also the case in most other European Countries. It should also be noted that stack gas scrubbing is expected to add some 30% to the capital cost of coal-fired stations.

Using the data for the Koeberg nuclear power station and for a pithead coal-fired station from the graph in Figure 2 and adding transmission costs, these costs are compared in Table III for the South African situation.

The actual cost per unit given in Tables II and III should not be compared directly, as they are dependent on the rate of exchange which at present cannot be taken as representative of long term average values.

However, it is evident that in France the capital related cost for a nuclear power station is only 39% higher than for a coal-fired station whereas in South Africa this figure is of the order of 74%. Also in South Africa the

TABLE II REFERENCE COSTS FOR FUTURE THERMAL ELECTRICITY PRODUCTION IN FRANCE*

| Type of Plant | Annual Load Factor | | | |
|---|--|----------------|-------------|----------------|
| | 100% | 45.6% | | 22.8% |
| | (cost in SA cents/kWh (%) R1.00 = f4.20) | | | |
| NUCLEAR | | | | |
| Capital charges | 2.71 | (51.6) | 5.26 | (58.8) |
| O & M | 1.02 | (19.4) | 2.00 | (22.3) |
| Fuel | 1.52 | (29.0) | 1.69 | (18.9) |
| Total | <u>5.25</u> | <u>(100.0)</u> | <u>8.95</u> | <u>(100.0)</u> |
| COAL | | | | |
| Capital charges | 1.95 | (29.1) | 3.60 | (39.4) |
| O & M | 0.83 | (12.4) | 1.60 | (17.5) |
| Fuel | 3.93 | (58.5) | 3.92 | (43.1) |
| Total | <u>6.71</u> | <u>(100.0)</u> | <u>9.12</u> | <u>(100.0)</u> |
| Coal with desulfurization (Stack gas scrubbing) | 9.29 | | 12.14 | |

*Nucleonics Week, Dec. 20, 1985, p. 7

TABLE III REFERENCE COSTS FOR NUCLEAR AND COAL-FIRED POWER STATIONS IN THE WESTERN CAPE - CURRENT PLANT AFTER 1 YEAR'S OPERATION (1985 RAND)

| Type of Station | Unit electricity costs at 70% load factor | | |
|-------------------------------|---|----------------|--------|
| NUCLEAR | | | |
| Capital charges | 3.67 | (62.0) | |
| O & M | 0.80 | (13.5) | |
| Fuel | 1.45 | (24.5) | |
| | 5.92 | (100.0) | |
| COAL | | | |
| Capital charges | 2.28 | (45.6) | |
| O & M | 0.35 | (7.0) | (8.4) |
| Water | 0.07 | (1.4) | |
| Transmission costs and losses | 1.52 | (30.8) | (46.2) |
| Fuel | 0.77 | (15.4) | |
| Total | 4.99 | | |

fuel costs are very much lower than in France for a coal-fired station. These two factors to a large extent account for the advantage of nuclear over coal in France while in South Africa coal still has a significant advantage over nuclear.

There are also a host of other factors which will determine the future role that nuclear power will play in South Africa.

SOUTH AFRICA

EXPERT CLAIMS NUCLEAR POWER DECISION PREMATURE

Johannesburg BUSINESS DAY 23 Aug 85 p 6

[Text]

SOUTH Africa, in economic terms, had entered the nuclear age too early, with the cost of electricity from Koeberg higher than that from a coal-fired power station in the Transvaal, Professor R K Dutkiewicz said in Johannesburg yesterday.

Dutkiewicz, head of the Department of Mechanical Engineering and Energy at the University of Cape Town, was speaking at the senate special lectures at the University of the Witwatersrand.

Dutkiewicz said much of the difference in costs had been due to political reasons which could not have been foreseen and which

Own Correspondent

could not be blamed on Escom or the Atomic Energy Board.

The decision on the next nuclear power station, however, would have to be based on sound economic grounds alone.

The subject of Dutkiewicz's lecture was "Energy Planning in South Africa — Its Problems and Challenges".

It is one of a series on South Africa's critical resources, their use and abuse.

He said: "The original decision to go ahead with nuclear power in South Africa was taken on the basis of break-even economics.

"It is always very dangerous to move into a new technology under such economic conditions.

A change in technology, especially such high-level technology as a nuclear power station with its requirements for highly-skilled manpower and safety, he added, should not have been started unless the economics were overwhelmingly favourable or alternate energy resource depletion was an important consideration. He said Koeberg was operating very satisfactorily.

"The cost of operating Koeberg is its marginal cost — the cost of fuel," he said.

CSO: 5100/42

SOUTH AFRICA

TRAINING PROGRAM OF KOEBERG'S OPERATING TEAM DISCUSSED

Johannesburg NUCLEAR ACTIVE in English Jul 85 pp 15-18

[Text]

Koeberg is a twin-900 MW Pressurised Water Reactor Power Station, of basic Westinghouse design, built under licence by Framatome. The plant is situated on the Atlantic coast approximately 40 km from Cape Town. How the South African Electricity Supply Commission (ESCOM) tackled the problem of ensuring that a fully-trained, competent management and operating team was ready to operate Koeberg at first fuel loading, is briefly but vividly dealt with in the accompanying article. The technology of nuclear power generation using a pressurised water reactor system was brand new to South Africa, making the training task a formidable one. Something of its wide scope can be assessed from the courses in theoretical training, which ranged from power plant principles, nuclear power plant orientation (light water reactors) and basic nuclear concepts to reactor operation, plant performance, radioactive waste and instrumentation and operational analysis. Intensive courses such as these were followed by training in systems and procedures (nuclear systems, power generation systems, auxiliary systems). Then came practical experience in France for the first two groups, who would see what they had learnt in theory applied there in practice, while others were occupied with on-going on-job training at Koeberg.

A final round-up put trainee comprehension and specific knowledge through the fine-meshed sieve of the licence examination, based on the requirements of the Nuclear Regulatory Commission (NRC) of the USA and held at Koeberg under the auspices of initially the Atomic Energy Board, now of the Atomic Energy Corporation of South Africa Limited. The brief of the AEC's Licensing Branch in broad terms is to ensure that Koeberg is run safely with regard to limits of exposure, both of Koeberg personnel and the public at large, to ionising radiation. In the final event trainees had to undergo a written examination (8 hours); a simulator examination (8 hours); a plant walk-around with an examiner (4 hours); and finally, an oral examination run as a formal interview in the presence of 2 or 3 examiners (4 hours). The reward of success: a licence to operate the PWR plant at Koeberg. Such was the type of training program devised for the first group of trainees that went for Licence in December, 1982. Since then, as the Head of Training at Koeberg points out, this specific training program has changed and is still changing to meet the technological advances that are being made overall in the nuclear industry.

Koeberg is on the tip of Africa. Nothing but Table Mountain and the ocean separates it from the South Pole. When Koeberg was conceived in the early '70s, there was no infrastructure from either the industrial or social spheres to support it. Now, in the mid '80s, Koeberg is up and running, safely and efficiently, with a fully-trained staff who can confidently expect to maintain the situation for at least the next 40 years. This article, without going into fine detail, outlines from Koeberg's Technical Training Unit viewpoint, how this feat has been achieved.

Objectives

Prior to commencement of the project a set of training objectives was discussed, investigated and agreed upon for the short, medium and long term. It was understood at the outset that flexibility should be the name of the game. It should be noted that at least half of the original medium-to-long term objectives now appear to be lost in the sands of time, and the other half have changed out of all recognition.

For example, one of the primary short term objectives that stood for a long time was to identify and train two pilot groups using 3 discrete phases:

Phase 1 to consist of a study of theoretical nuclear concepts relating to power reactor operation.

Phase 2 consisting of attachment to a French PWR station, 'shadowing' personnel operating the plant.

Phase 3 dissemination of the information and experience gained throughout the remaining station staff at Koeberg.

A long term training objective was to ensure that when the station was ready to start-up, it would be manned with fully qualified personnel in all areas. Ten years ago, this appeared to be an objective fully within the capability of the resources available. We can recognise now how naive we were with regard to this objective, having had no idea of the numbers and types of people who had to be qualified in all the separate disciplines on site.

Manpower and motivation

As there was no comparable or reference nuclear industry in South Africa, the nucleus of people would have to be trained from first principles, using as a basis the generic training information

readily available throughout the world-wide nuclear industry. Two pilot groups of about 16 persons to each group were formed. The majority in these groups was recruited from within ESCOM, with a sprinkling of ex-Royal Navy nuclear personnel. Although these groups formed the basis of Koeberg's management structure, it was accepted that in addition to the normal administrative duties associated with any management organisation, they were all students and would remain so for some conceivable time. With hindsight, the attributes of ambition, empathy and resilience were evident from the word go. The plan required that these pilot groups would provide the basis of training for the rest of the plant staff. 'It's OK to be at the sharp end, just as long as we know how long the point is!' This wry comment exemplified the group impression of an overriding will to succeed with the project, and the complete dedication to the task, no matter how adverse the climate appeared to be at the time. To the reader I would suggest that the group's motivation to succeed in any new task may override such criteria as necessary knowledge at the outset and/or experience.

Nuclear-related training

The technical training of the nuclear power station staff does not, as is generally thought, concentrate only on the reactor operators. Every person employed on a nuclear site must undergo some aspect of training that is peculiar to the nuclear industry. This includes contractors' staff, corporate staff and the myriad other groups that from time to time have need to visit the plant. The typist employed in an administrative position may not require to be taught how to type or use a word-processor, but she will need training in aspects of basic radiological protection and emergency response.

Therefore it can be said that anyone coming to Koeberg for the first time, will require some degree of technical training. The amount and depth of that nuclear-related training will depend on the degree of involvement of that person with the plant, and his or her level of experience prior to joining.

As we move into the more nuclear-related, technically orientated areas this amount of training increases and diversifies to include such subjects as nuclear physics, environmental surveying,

The French phase – parlez Français!

To help put their theoretical knowledge to good account, in the practical sense, Koeberg's first trainees were flown to France where Electricité de France (EDF) have a department (MACE) to meet the training needs of countries buying the French PWR system. MACE (Mission d'Assistance aux Etrangers) undertakes the formal, specific training of operators to an agreed-upon standard, as well as overseeing the on-job training carried out at French PWR stations. The Koeberg pilot groups with their families were accommodated in a suburb of Lyon. They first underwent a highly intensive French language course, arranged between MACE and ESCOM, and carried out by Cavilam, an international language training centre based at Vichy. Its highly effective training had the equally effective result of greatly easing relations with the contractor by enabling the groups to converse as fluently in French as in English. A second advantage of this in-built skill was the ability to translate quickly and accurately the documentation that arrived on site, when the groups were back in South Africa. The most 'fluent' South African operator at the start of the course had received an English High School Certificate in French grammar! With French at their fingertips in a remarkably short time, the class proceeded to see theoretical concepts put into functional operation at Bugey

and Tricastin Power Stations (Bugey being the reference plant for the secondary systems and Tricastin for the primary systems). The behaviour of each system was made clear with regard to control, operation and plant safety by French instructors – engineers and ex-shift supervisors – drawn from within EDF.

Shadowing

In the final phase of French training, Koeberg students were attached for 6 months to operating stations for the purpose of 'shadowing' operating personnel. The trainees assigned to a particular station were attached to a normal shift and followed the shift's operating cycle throughout their time at the station. Apart from the general gathering of knowledge, each man was given particular groups of systems in which he eventually became expert. On return to South Africa, the 'experts' became the clearing house for any queries regarding that group of systems. During this invaluable period of shadowing, the trainees gained experience of the operating shift requirements and carried out, under supervision, the type of work they would be doing at Koeberg. Also, during this period three training sessions of a fortnight each were spent at the Bugey simulator undergoing the same training as given to the French operators.

reactor operation, system knowledge, radiochemistry, procedure compliance, etc.

The great problems facing a Technical Training Unit in a situation such as Koeberg with its long lines of communication, lack of supporting infrastructure, lack of experience and knowledge are:

- Who needs what?
- When do they need it?
- Who's going to give it?

Specialists may throw up their hands in horror when I say that in this situation we trained 'by the seat of our pants'. By 'we', I mean all Departmental and Section Heads. It was quickly recognised that the Station Training Section was unable to provide all the training that was being identified, especially in such specialist areas as chemistry, mainten-

ance, planning, and reactor physics. Therefore most departments arranged their own training to meet the common goal, with the Training Section providing a means of recording the training in order to meet stringent Quality Assurance requirements.

We had a simulator (a mirror-image of the control room), we had a store of information that increased in size daily, we had the basic courses produced, so we started. We saw a need, or were given a requirement and we reacted as quickly as possible. As requirements changed (in some cases out of all recognition), so methods were quickly changed to meet them. We used existing generic material, bought 'off the shelf', and adapted it to our needs; we produced our own technical training ma-

terial and altered it as more information became available; we forgot organisation hierarchy and cut across boundaries in order to get the job done. We learnt more from our mistakes than we learnt from books. We were short on knowledge and experience within the training area, therefore we recruited experienced instructors from abroad to bolster our own staff. Costs were high but measured against the cost of not meeting set deadlines, they were comparatively cheap in the long run.

The dividends were handsome: a station that is running, fully manned, licensed and its authorised staff predominantly South African, and with a technical training program distilled from our own experience, particularly suited to the South African scene, and set up to maintain the state of expertise required.

What have we learnt?

(A minimum of 10 Commandments)

1. Dependent on the degree of nuclear power generation knowledge and experience already available within the organisation, start technical training and preparing training courses for a new nuclear station 7-10 years prior to first start-up. We estimate that within 5 years from commencing training the group becomes self-supporting and can then arrange its own recruitment and training schedules.
2. Adopt an open-management policy throughout the organisation to facilitate decision making. This may appear at first sight cumbersome and time wasting but we learnt from bitter experience that a lot of time, not to mention money, can be saved by including all concerned when a decision has to be made (including the typist who may have some vital input). This is one aspect, a vital area, we wish to follow from now on.
3. Carry out an initial Task Analysis of the job to be done by experienced personnel and ensure that this analysis is revisited (re-examined) at least every six months. In this way the moving target you are aiming at remains at least in peripheral sight instead of performing quantum leaps without your knowledge.
4. Decide on where your workforce is coming from and ascertain whether there is an acceptable degree of basic knowledge available, and devise the training programs accordingly. It is no use using programs devised for a highly sophisticated, Westernised culture, to present to a group whose cultural and

ethnic background precludes acceptance.

5. Use the existing workforce to solve problems as much as possible. Do not buy in extra expensive expertise before ascertaining whether your own people can assist. The old adage 'It must be good, because we've paid top dollars for it' tends to be de-motivating to your own staff when their ideas are not used and the same proposal is accepted from a consultant body.

6. Always, always, plan ahead even though you know that the plan may be changed tomorrow.

7. Decide which areas your training function can cover successfully with the staff allocated to it, and then ensure that all other departments know those limitations. At commencement of a project such as a new power station, many of the staff other than Training may and can be co-opted to assist in the training function, but the pool of expertise rapidly diminishes as plant and systems begin to come to life and demand increasing attention from the line departments. Courses that were by custom presented by the Training Unit using co-opted staff, tend to remain the responsibility of the Training Unit and you can find yourself stretched very thinly indeed when all course presentation remains the responsibility of Training.

8. Set up a close relationship with the Manpower Planning function to ensure that future training requirements can be met timeously.

9. Ensure that the Training lecturers and instructors are of sufficient calibre to be credible when in front of their classes. Decide from whence you will be recruiting them (internally and externally) and ensure that Manpower Planning accepts that supernumary training positions may be acquired. We estimate that it takes 4 to 5 years to train a simulator instructor and preferably he or she should come from the Technical departments.

10. Get the salary levels correct with regard to the training function. Pay should be commensurate with current market values (worldwide, not country-wide) and in line with comparable levels within the station organisation. Training is king at the start and then tends to be the jester when everything appears to be running smoothly.

As can be deduced from the foregoing, the technical training function for a new nuclear power station is no different

Assimilating simulator training

The largest, most costly item of training at Koeberg, the simulator – a mirror image of the actual control room – played and continues to play an important part in the more advanced training of nuclear power plant operators. During a 9-week intensive course, trainees were familiarised with the panels, synoptics, indicators and alarms. The teams were guided through procedure, gaining confidence whilst manipulating the controls. They commenced with a warm-up of the primary system from Cold Shutdown condition to Hot Shutdown. An estimated Critical Rod Position was then calculated and after the team had taken the reactor to critical condition, they commenced the conditioning of the secondary systems, after which the turbine was run up and synchronised to

the grid, and power was raised to 100 %. This first exercise usually took 4 simulator days to complete. The trainees then practised the approach to criticality, raising power, changing power whilst remaining within given parameters without having an excessive amount of effluent in the treatment system and, finally, shutting-down the plant under controlled conditions. After a 2-week break, the students returned to the simulator to practise operating with Recoverable Incidents (as distinct from accident situations). The instructor would inject one or two faults at a time, using a library of about 160 faults, and note how the trainees reacted, taking into account their diagnoses of the problems and their subsequent recovery actions. Thereafter they were permitted to move

on to the final phase where they had to deal with major problems such as steam-pipe rupture, steam-generator tube rupture and loss of coolant accidents, as well as having to operate the plant from the Remote Emergency Panel. (Accident and Transient Analysis for each major parameter was studied in detail prior to practice on the simulator). In their final two weeks, the trainees were put through five hours per day of Simulator Operation, together with oral and written examinations. The simulator conditions were set by the instructor at commencement of each simulator period and from then on the trainee could expect anything or everything to be asked of him. The examination was also used as a review of all the training carried out previously.

from that in any other new situation. The compounding effects of distance, culture, degree of social and educational development, social attitudes and above all, availability of appropriate technical knowledge will be the same anywhere in South Africa, or anywhere in the world. The trick is to know how and where to spend the money to get the best and most efficient return. One must expect that with the first plant the investment is going to be high, but the return on investment in knowledge, experience, future savings and reliability will also be high.

Nothing under wraps

No attempt has been made to disguise the state of 'organised chaos' that existed in the early stages of training routines. However, that very state has

enabled us to distil out and identify a method of training power station operators that we believe is comparable with the best in the world and is specific to the needs of South Africa. The training function from now on will be concentrating on the evaluation and fine tuning of the product, adding and taking away, altering to meet new requirements, and forever checking that we are not out of date.

The situation will never happen again in South Africa as we now have a working nuclear power station. The degree of preparation required is now known. The situation we experienced may and most probably will happen in other developing countries at some later date. For them some or all of the lessons we learned could well be vital.

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ITALY

BRIEFS

TWO NEW TESTING FACILITIES--Recently, at the Ispra center, two new systems entered in operation. They are being used for research on safety in the nuclear sector. The Faro system, the largest in Europe, will be used to conduct research on phenomena typical of fuel movement inside nuclear reactors. The system costs between five and six million Ecu and will be funded out of the EEC research and development budget. It is considered of major importance to show the behavior of a reactor in the case of serious damage to the core. The other system includes a machine which will be used for testing conventional structures. This is the Large dynamic test facility (Ltdf), equipped to work on large dynamic loads and designed to study and evaluate the safety level of installations under special circumstances, such as, for example, a surge in power in a reactor, an airplane falling on a plant or an earthquake tremor. [Text] [Rome NOTIZIARIO DELL'ENEA in Italian Mar 85 p 80] 12667

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